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WESTERN BIRDS

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DISTRIBUTION AND HISTORY OF CALIFORNIA GULL COLONIES IN NEVADA

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Conover (1983) reported on breeding populations of the California Gull (*Larus californicus*) in the western United States and found that the total number of nesting birds in the 1980s had nearly tripled from that in the 1920s (276,000 vs. 101,000). The species' status in Nevada is not well documented, even though rookeries are restricted to a few localities in the western part of that state. For example, Power (1980) presented low and high estimates for the number of breeding adults of 1800 and 7512, respectively, whereas surveys conducted by U.S. Fish and Wildlife Service (USFWS) and Nevada Department of Wildlife (NDOW) biologists during the late 1980s suggest there may be more than 15,000.

In this paper we review what little is known about the status of the California Gull in Nevada, with emphasis on recent population estimates from Stillwater National Wildlife Refuge (NWR), Pyramid Lake (Anaho Island NWR), Fallon NWR, and Lahontan Dam and Reservoir (Figure 1). Our survey is based on the literature, communication with wildlife managers and knowledgeable local biologists, and on Annual Narrative Reports and other documents in USFWS and NDOW files. We report counts by management areas (e.g., wildlife refuges) because data were often presented that way in the unpublished reports we consulted; this occasionally gives the misleading impression that areas are widely separated when they are in fact adjacent. Indeed, these areas were often combined in the reports we reviewed (e.g., Stillwater Wildlife Management Area [WMA] Annual Narrative Reports included Stillwater NWR and parts of Fallon NWR).

HISTORY OF GULL COLONIES

Pyramid Lake (Anaho Island and Gull Rock)

California Gulls on Anaho Island (a 100-ha National Wildlife Refuge established in 1913) in Pyramid Lake now nest on a sandy beach on the south end of

the island and among the greasewood (*Sarcobatus vermiculatus*) and saltgrass (*Distichlis spicata*) flats along the west side of the island (Figure 2). Historically, gulls nested in rocky habitat on the northern shore (e.g., figure 3 in Ridgway 1877, figure 17 in Woodbury 1966). Data on the Pyramid Lake colony from 1868 through 1990 are given in Table 1. Ridgway (1877:637) described the gull colony in May 1868 as "immense," spreading over "several acres of ground." As the densest nesting areas for this species (at Mono Lake, California, and Great Salt Lake, Utah) contain up to 1000 pairs/acre, we infer that the colony seen by Ridgway numbered 4000-6000 birds. There were still "many" on Anaho Island in 1879 (Henshaw 1879), but by 1917 gulls had abandoned the island for Gull Rock, a group of small pinnacles (18 × 27 m, elevation 18-21 m) at the northern end of the lake. Evermann (1923, cited by Hall 1926)

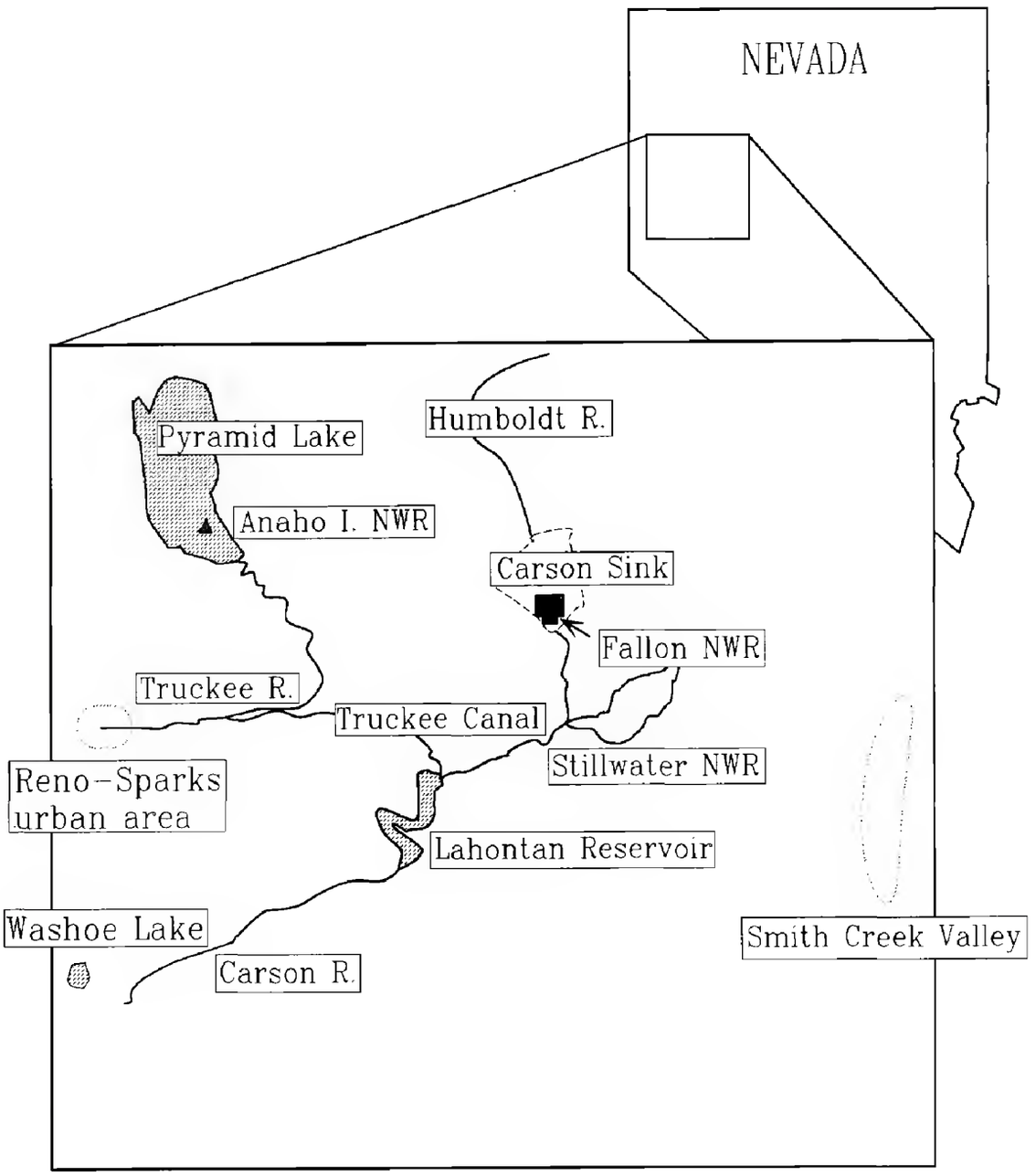

Figure 1. Location of California Gull colonies in Nevada.

estimated about 300 nests on Gull Rock in 1917, similar to Hall's (1926) estimates of 600 adults and young in 1924 (Hall [1929:2] later stated that his estimate of 600 was "far too low" but did not clarify this). Hall also observed large numbers of gulls near the American White Pelican (*Pelecanus erythrorhynchos*) colony on Anaho Island in 1924 but saw only one nest that was later abandoned.

Ridgway (1877:638) reported that "many bushels of eggs were gathered for food," and it might be that human disturbance and egging prompted a population decline and shift in nesting location, although the record is not sufficient to confirm causality. In any event, Hall (1929), in a letter to H. P. Sheldon (U.S. Game Conservation Officer), urged that Pyramid Lake be designated a bird reservation, primarily because of disturbance to American White Pelican colonies, but he also noted that California Gulls and Double-crested Cormorants (*Phalacrocorax auritus*) "[have] of late years suffered great destruction of eggs and young in the same way as has the White Pelican on Anaho Island."

Native Americans continued to collect eggs after the gull colony moved to Gull Rock, as Hall (1924:3) reported: "I learned that three days previous to my arrival at the lake [15 May 1924], an Indian fisherman had visited the rock and taken all the eggs for food. That they laid again was indicated by my count of three hundred (300) young gulls made on June 28 when I visited the rock."

California Gulls had resumed nesting on Anaho Island by 1927, when Gromme (1930) reported seven nests there; by 1940 there were 200 nests

Figure 2. California Gull rookery at Anaho Island National Wildlife Refuge, Pyramid Lake, Nevada, 23 July 1990.

Photo by Frank S. Todd

Table 1 Numbers of California Gulls at Anaho Island, Pyramid Lake, Nevada

Date	Estimated or Counted Adults	Estimated or Counted Nests	Estimated or Counted Young	Total Estimated Population	Source
1868				"immense"[a]	Ridgway 1877
1879				"many"	Henshaw 1879
1924		1[b]			Hall 1924
1927		7			Gromme 1930
1929				0[c]	Hall 1929
1940		200			Bond 1940
1942		504			G. Alcorn, cited in Marshall and Giles 1953
1948		1000			V. Mowbray, cited in Marshall and Giles 1953
1950	2000		400[d]		ANR, SWMA[e]
1951	1800	1706	684	4000	Marshall and Giles 1953
1952		1500	1400	4500	ANR, SWMA
1953		1500	900	4000	ANR, SWMA
1954		1500			ANR, SWMA
1955	2000[f]				ANR, SWMA
1956	2600	1750			ANR, SWMA
1957		1950			ANR, SWMA
1958	3000	1700	3000		ANR, SWMA
1959		2000	3500		ANR, SWMA
1960		2000[g]			ANR, SWMA
1961	2150		2000		ANR, SWMA
1962	2550		3500		ANR, SWMA
1963			2500		ANR, SWMA
1964		1000	2100	4000	ANR, SWMA
1965		1200	2500	4500	ANR, SWMA
1966		1200	2500	5000	ANR, SWMA
1967		3000	4500	8000	ANR, SWMA
1968		2800	4200	9000	ANR, SWMA
1969		2200	4000	7500	ANR, SWMA
1970		2500	4625	10,000	ANR, SWMA
1971		1931	2895[h]	6900	ANR, SWMA
1972		2100	2950	7000	ANR, SWMA
1975			3500		ANR, SWMA
1977		3000			H. Kingery, cited in Alcorn 1988
1978			800		ANR, SWMA
1979	2975		900	3875	ANR, Anaho, 1. NWR
1980	3400		750	4150	ANR, Anaho, 1. NWR

Table 1 (Continued)

Date	Estimated or Counted Adults	Estimated or Counted Nests	Estimated or Counted Young	Total Estimated Population	Source
1981	4000	1750	600[i]		ANR, Anaho I. NWR
1982		1900			ANR, Anaho I. NWR
1983		2150	1100		ANR, Anaho I. NWR
1986	3550	2660[j]			Thompson 1987
1987	2800	2100			Bill Henry, pers. comm.
1988		2500			Bill Henry, pers. comm.
1989		1900			Bill Henry, pers. comm.
1990		1680			Bill Henry, pers. comm.

[a] 4000 - 6000; see text.
[b] One nest with one egg observed on south shore; nest later deserted. Hall (1924) noted large numbers of adults near pelican colony, to prey on eggs and chicks. Most nests were on Gull Rock; Hall estimated 600 adults and immatures but later felt this number to be "far too low" (Hall 1929).
[c] Author stated "at present and for many years past, the California Gulls. . . have nested many miles away from Anaho Island in the northern end of Pyramid Lake," presumably on Gull Rock.
[d] Mortality of juveniles very high due to banding operations.
[e] Annual Narrative Report, Stillwater Wildlife Management Area.
[f] High mortality of juveniles; no numbers given.
[g] Lowering lake level threatened to connect island to mainland.
[h] Authors noted production down 38% from 1970.
[i] Number fledged.
[j] 13 May estimate; on 12 June, when most young had fledged recently, estimate was 4500 adults on 4500 nests.

present (Bond 1940). During the 1950s the colony fluctuated between 1500 and 2000 nests (Marshall and Giles 1953, Stillwater WMA Ann. Narr. Repts.). Data for the 1960s are difficult to interpret because of unequal censusing effort and inconsistent methods of censusing and reporting data, the precision of which is unstated. From 1964 through 1966 annual estimates of nests by USFWS personnel ranged from 1000 to 1200, but in 1967 and 1968, 2800 - 3000 nests were reported. From 1969 through 1977 counts were similar to 1950s levels, with two exceptions: 2500 in 1970 and 3000 in 1977. Nest counts resumed in 1981 after a lapse of several years and again were similar to 1950s levels; in two years, however, counts were higher (2660 in 1986, 2500 in 1988; Thompson 1987). There were 1680 nests present in 1990 (B. Henry pers. comm.). These counts are based on aerial surveys and ground counts from elevated observation points, and nest estimates are believed to be accurate to within 20%. Note that recent counts are similar to the probable size of the colony described by Ridgway (1877) in the 1860s.

Stillwater National Wildlife Refuge

Stillwater WMA, which includes Stillwater NWR, was established in 1948 and currently covers about 200,000 acres. Thompson and Merritt (1988) noted that the quality and quantity of its water has been steadily declining, as its source is return flow from irrigated land; for example, estimated wetland acreage declined from over 23,971 in 1986 to 4,388 in 1988 (Thompson and Neel 1989).

California Gulls nest, or have nested, at two sites within Stillwater NWR: Stillwater Point Reservoir and Stillwater Marsh. In most years data are available only for the WMA as a whole, rather than by site, but in Table 2 we have in-

Table 2 Numbers of California Gulls in the Stillwater National Wildlife Refuge, Nevada

Date	Estimated or Counted Adults	Estimated or Counted Nests	Estimated or Counted Young	Source
1950		15	32	ANR, SWMA[a]
1951		100	128	ANR, SWMA[a]
1952		100	100	ANR, SWMA[a]
1953		15	20	ANR, SWMA[a]
1954		20	25	ANR, SWMA[a]
1955		80	100	ANR, SWMA[a]
1967	300[b]			ANR, SWMA[a]
1972	100[b]			ANR, SWMA[a]
1977		1700		H. Kingery, cited in Alcorn 1988
1986		1200		NDOW Rept.
1987	1350[c]			NDOW Rept.
1988		0		Thompson and Neel 1989
1989		0		NDOW Rept.
1990		0		NDOW Rept.
Stillwater Point Reservoir[d]				
1950		13	20[e]	Marshall 1951; ANR, SWMA
1951			100	ANR, SWMA
1954[f]				ANR, SWMA
1955[g]	426			ANR, SWMA
1956		37[h]		ANR, SWMA
1957		49[i]		ANR, SWMA

[a] Annual Narrative Report, Stillwater Wildlife Management Area.
[b] No nesting; see text.
[c] Breeding pairs.
[d] Small bare island, used for first time in 1950, abandoned several years later.
[e] Estimated 6 reached maturity.
[f] Nesting gulls still present.
[g] Colony on island "overflowed," some adults moved to shoreline of Stillwater Pt. and to Nutgrass Dike; predation was high in both areas.
[h] Nests counted on 24 May.
[i] 26 of these on point of land on shoreline.

cluded the few counts we found for Stillwater Point Reservoir; two counts for Stillwater Marsh are presented below.

Nest counts made in the 1950s ranged from 15 (1950, 1953), to 100 (1951, 1952) (Stillwater WMA Ann. Narr. Repts.). Ten of twelve counts made by USFWS biologists in the 1960s and early 1970s combined California and Ring-billed (*Larus delawarensis*) gulls and therefore could not be used. About 300 California Gulls were present in 1967 and 100 were present in 1972, but apparently none nested; L. Napier (in Alcorn 1988) stated that there was "no nesting at Stillwater from 1967 to 1974." P. Schwabenland (in Alcorn 1988) also reported that California Gulls "come to feed from Anaho where they nest. Have nested at Stillwater in the past although not at present [1974]." From 1976 on, abundance is reported as "use days" with a few anecdotal comments (Stillwater WMA Ann. Narr. Repts.) and is therefore essentially uninterpretable. For example, USFWS biologists reported that in 1976 use was down 65% and production was down 85% from 1975, and that use dropped to an all-time low (about 15% of long-term averages) in 1978. There is one report of 1700 nests in 1977 (H. Kingery, in Alcorn 1988). In 1980, gulls were considered "more abundant' than in 1979, but no numbers were presented (Stillwater WMA Ann. Narr. Repts.). In 1986, 1200 nests were reported, and 1350 breeding pairs were observed in 1987 (NDOW Repts.). No California Gulls nested in the refuge in 1988, 1989, or 1990 (NDOW Repts.; Thompson and Neel 1989).

The few counts reported for individual sites within Stillwater WMA are summarized below.

Stillwater Point Reservoir. Stillwater Point Reservoir was first used by nesting California Gulls in 1950, when the refuge biologist recorded 13 nests with 20 young on a small bare island (Stillwater WMA Ann. Narr. Repts.; Marshall 1951). The next report of nesting was in 1955, when 426 adults were counted and the colony "overflowed" to the shoreline of the reservoir and Nutgrass Dike (where predation was high); in 1957 approximately half of the 49 nests counted were on the shoreline and half were on the island within the reservoir (Stillwater WMA Ann. Narr. Repts.). There are no other reports of nesting on the reservoir.

Stillwater Marsh. Only two counts are reported for Stillwater Marsh: "total estimated populations" of 200 and 250 in 1951 and 1952, respectively (Stillwater WMA Ann. Narr. Repts.).

Lahontan Dam and Reservoir

California Gulls nest on two rocky islets (Gull Island and Walleye Island, each approximately 2.4 m above water level) within Lahontan Reservoir (Table 3). The colony at Gull Island (0.52 ha) apparently was not active before 1930 (Conover 1983), but its exact date of establishment is unknown. Alcorn (1988) reported that over 60 chicks were banded there in 1939 and 1940, with nest counts in the early 1940s ranging from 172 to 380. The next counts were made about 40 years later, when Gubanich and Judd (1988) reported that 4000 pairs nested there from 1983 through 1985; they have since revised this estimate downward to 3000 pairs (Gubanich pers. comm.). In 1989, Gubanich and Judd counted 2710 nests on Gull Island in mid-May, and in 1990 counted 2986 nests in 12 May (an additional 30 nests were completed later; Gubanich pers. comm.). The colony on Walleye Island (actually a small group of Califor-

Table 3 Numbers of California Gulls at the Lahontan Dam and Reservoir, Nevada

Date	Estimated or Counted Adults	Estimated or Counted Nests	Estimated or Counted Young	Source
1939			65[a]	Alcorn 1988
1940			61[a]	Alcorn 1988
1941		172		Alcorn 1988
1942		380		Alcorn 1988
1943		246		Alcorn 1988
1944		364		Alcorn 1988
1946		342		Alcorn 1988
1983 - 85		3000[b]		A. Gubanich, pers. comm.
1989	2710			A. Gubanich, pers. comm.
1990	3016			A. Gubanich, pers. comm.

[a] Number of young banded.
[b] Gull Island.

nia Gulls nesting among ca. 2000 pairs of Ring-billed Gulls) was established in 1986, when it consisted of 100 nesting pairs; approximately the same number nested there from 1987 through 1989, with a slight increase to about 150 pairs in 1990 (Gubanich pers. comm.). Gubanich and Judd (1988:126) reported that disturbance (including shooting by humans and nest destruction by dogs) is "a constant threat" at Lake Lahontan, which is a Nevada State Recreation Area.

Fallon National Wildlife Refuge

Fallon NWR (Table 4) was established in 1931, but Thompson and Meritt (1988) reported that a permanent marsh no longer exists because the inflow of water has been sporadic since 1967. Nesting has been reported at three sites within the refuge: Battleground Point, Gull Island, and Pelican Island.

Two large islands (Battleground Point and Gull Island), isolated in the Carson Sink by floods, were used by hundreds of gulls in the mid-1980s. Carson Sink, normally an alkaline playa, was transformed into a 30,000-ha lake with water up to 4 m deep. The lake was quickly pioneered by dense populations of fish (e.g., Tui Chub [*Gila bicolor*] and carp); gull nesting apparently was initiated in 1984. These two colonies produced approximately 2000 young annually before disappearing after 1987 because of low water, although few accurate counts are available (NDOW Repts.; Stillwater WMA Ann. Narr. Repts.).

The "total estimated population" of California Gulls at Pelican Island was 50 in 1952 and 260 in 1956; there were no gulls present in 1951 or 1957 (Stillwater WMA Ann. Narr. Repts.). The next count was in 1987, when 450 pairs were present; there was no nesting in 1988, 1989, or 1990 (NDOW Repts.).

Table 4 Numbers of California Gulls in the Fallon National Wildlife Refuge, Nevada

Date	Estimated or Counted Adults	Estimated or Counted Nests	Total Estimated Population	Source
Pelican Island				
1951			0	Ann. Narr. Rept., Stillwater WMA
1952			50	Ann. Narr. Rept., Stillwater WMA
1956			260	Ann. Narr. Rept., Stillwater WMA
1957			0	Ann. Narr. Rept., Stillwater WMA
1987	900[a]			NDOW Rept.
1989		0		NDOW Rept.
1990		0		NDOW Rept.
Gull Island				
1986	3000	1200		NDOW Rept.
1987	1800[a]			NDOW Rept.
1988[c]		0		Thompson and Neel 1989
1989		0		NDOW Rept.
1990		0		NDOW Rept.
Battleground Point				
1986		300[b]		NDOW Rept.
1988[c]		0		Thompson and Neel 1989
1989		0		NDOW Rept.
1990		0		NDOW Rept.

[a] Nesting pairs.
[b] Displaced by American White Pelicans by 15 May.
[c] Unsuccessful nesting attempt.

Other Nevada Colonies

According to N. Saake (pers. comm.) approximately 500 pairs nested on islands in Washoe Lake (Figure 1) from at least the 1960s through 1975. However, because the gulls' activities increased erosion rates of the islands, which were designed mainly as waterfowl habitat, attempts were made to eradicate the colony. In recent years up to 50 pairs have bred there, but nesting has been sporadic.

Approximately 150 pairs attempted nesting on Artesia Lake, Smith Valley (Figure 1), in 1987, but evidently failed to fledge young (NDOW Repts.). The area has been dry in subsequent years.

Conover (1983), citing G. Herron (pers. comm.), reported breeding gulls at Reno city parks, Truckee River, and Wild Horse Reservoir, but did not include the year(s) observed or population size. Power (1980), citing a personal communication from G. Herron to D. Babb, also reported nesting within Reno city

limits. Power (1980) also listed Walker Lake, Carson Lake, Humboldt Lake, and Riptor Reservoir as possible breeding sites, but could not obtain written substantiation for them and so did not include them in his summation. N. Saake (pers. comm.) reported that no California Gulls currently nest at Humboldt, Walker, or Carson lakes, and the biologists and refuge managers we talked to were unfamiliar with Riptor Reservoir. S. Faraisl (pers. comm.) reported that approximately 600-700 pairs nested in the Reno-Sparks urban area in 1989 and 1990: 250 pairs at Highland Reservoir, 250 pairs at Virginia Lake, and several small colonies along the Truckee River. The chicks at Highland Reservoir, which supplies drinking water to Reno, were removed when the colony was determined to be a human health hazard.

DISCUSSION

The breeding distribution of California Gulls in Nevada is highly localized in the western part of the state (Figure 1). Because it is constrained by the availability of secure nesting sites, which vary with water conditions, major colonies can persist only at permanent bodies of water (e.g., Lahontan Reservoir, Pyramid Lake). Other colonies in this desert landscape are small and ephemeral, and form or vanish as quickly as water conditions change (e.g., Carson Sink).

While it is not possible to reconstruct the history of the Nevada colonies in any detail, it is evident that the state population numbered several thousand birds in the 1870s, decreased to a few hundred breeding pairs in the 1920s, then increased to approximately 7500 pairs in the 1980s. The maximum increase appears to have occurred between 1940 and 1970. Note, however, that much of the recent growth seems attributable to the Lahontan Reservoir area, because the Pyramid Lake colony seems to have stabilized at roughly 4000-6000 breeding adults in the past two decades.

Population trends at Pyramid Lake parallel those at the nearby Mono Lake, California, where the colony grew rapidly in the middle decades of this century but then remained stable in the 1970s and 1980s (Jehl et al. 1984, 1988; for data on Great Salt Lake, Utah, see Paul et al. 1990). We suspect that these changes and the increase in the species' population in the mid-20th century (Conover 1983), as well as the increase of other large gull species in the Northern Hemisphere (e.g., Herring Gull, *Larus argentatus*; Chabrzyk and Coulson 1976), were due largely to enhanced winter survivorship.

It remains to be determined why growth seems to have ceased at Pyramid Lake, where over the past two decades numbers have been similar to those we infer for the 1860s. This correspondence is surprising, because there have been important local changes in factors that might affect gull numbers, e.g., increased protection from human disturbance via formation of a wildlife refuge, law enforcement and education efforts, changes in the ecology of Pyramid Lake, and declines in some fish species (Buchanan and Coleman 1977). Perhaps the limiting factors affecting that colony—although different from those of the last century—still, fortuitously, sum to the same carrying capacity. The alternative is that the same factors operate unchanged; if so, they remain to be identified.

SUMMARY

Californa Gull (*Larus californicus*) rookeries in Nevada are concentrated in the western portion of the state. There are a few permanent colonies (e.g., Pyramid Lake), but others, whose status depends on water conditions (e.g., Carson Sink), are ephemeral. Here we review the history and current status of California Gulls in Nevada. Surveys suggest that the breeding populations there may be larger (ca. 15,000 breeding adults in 1985 and 1986) than previously reported.

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EFFECTS OF BROOD PARASITISM BY BROWN-HEADED COWBIRDS ON WILLOW FLYCATCHER NESTING SUCCESS ALONG THE KERN RIVER, CALIFORNIA

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Alteration and loss of riparian habitat have played a central role in the decline of riparian bird species (Gaines 1974, Remsen 1978, Laymon et al. 1987). However, the absence of certain species from seemingly suitable habitat (Gaines 1974) suggests that other factors may also be important. In his review of the historical riparian avifauna of the Sacramento Valley, Gaines (1974) suggested that 9 of 12 of the declining species, including the Willow Flycatcher (*Empidonax traillii*), were susceptible to and had probably been adversely affected by Brown-headed Cowbird (*Molothrus ater*) brood parasitism.

Brood parasitism by Brown-headed Cowbirds has been implicated in the decline of songbirds in eastern deciduous forests (Mayfield 1965, 1977a, Brittingham and Temple 1983) and in western riparian habitats (Gaines 1974, 1977, Goldwasser et al. 1980, Laymon 1987). Brown-headed Cowbirds increased their range with the clearing of forests and spread of intensive grazing and agriculture. These changes increased the amount of suitable foraging habitat available to cowbirds and rendered their host populations more vulnerable by reducing their numbers and fragmenting their habitat (Mayfield 1977a, Rothstein et al. 1980, Brittingham and Temple 1983, Laymon 1987). Riparian birds are especially susceptible to brood parasitism because their habitat is linear, ecotonal, often patchy, and frequently near pastures, stockyards, or agricultural fields. Thus the cowbird's favored feeding areas (heavily grazed pasture, stubblefields, livestock concentrations) are near its potential hosts in the riparian vegetation. Brown-headed Cowbirds commute from feeding areas to habitats with high host density (Rothstein et al. 1980, 1984, Stafford and Valentine 1985).

The Willow Flycatcher is one of many riparian bird species that have suffered serious declines in the southwestern United States (Gaines 1974, Serena 1982, Harris et al. 1987a,b). In recent years the Willow Flycatcher has been included on the Audubon Blue List (Arbib 1979, Tate 1981, 1986, Tate and Tate 1982), the U.S. Forest Service's Region 5 (California) Sensitive Species List, the U.S. Fish and Wildlife Service's Region 1 (California, Oregon, Washington, Idaho, Nevada) Sensitive Species List, and it was considered a Species of Special Concern by the California Department of Fish and Game beginning in 1978 (Remsen 1978). In California, where all Willow Flycatchers occur in isolated remnant populations (Serena 1982, Harris et al. 1987b, Unitt 1987), the species was recently listed as endangered by the California Fish and Game Commission. The Willow Flycatcher also is listed as an endangered species in Arizona. The southwestern subspecies (*E. t. extimus*) has been reduced to an estimated 500-1000 pairs in California, Arizona, New Mexico, Utah, Nevada and Baja California (Unitt 1987).

Early studies in lowland southern California showed that the Willow Flycatcher is a host for Brown-headed Cowbirds (Hanna 1928, Rowley 1930, Friedmann 1963). Friedmann (1963) reported 150 instances of parasitism of Willow Flycatchers, 41 of them in southern California. Hanna (1928) found more parasitized nests of Willow Flycatchers than of any other species, and commented on the difficulty of finding an unparasitized Willow Flycatcher nest. The decline of the Willow Flycatcher in central and coastal California coincided with the cowbird's range expansion in the 1920s and 1930s (as summarized by Gaines 1974, Garrett and Dunn 1981, Laymon 1987). Unfortunately, early studies did not report parasitism rates for Willow Flycatchers, nor did they follow nests through the breeding season; thus the responses of Willow Flycatchers to parasitism and the fledging success rate under parasitism remain poorly known for southwestern riparian habitats (Brown 1988). The incidence of parasitism observed in recently studied California montane meadow populations is low (Stafford and Valentine 1985, Valentine et al. 1988, Sanders and Flett 1989), suggesting that parasitism rate could be related to elevation or habitat differences.

The purpose of this investigation was to study the characteristics and success rate of Willow Flycatcher nests in a habitat representative of the former core, and remaining lowland portions, of the flycatcher's range in California. The study population (on the Kern River, Kern County, California), is the largest remaining Willow Flycatcher population documented in California (Harris et al. 1987b) and is one of the largest populations in the total range of the subspecies *E. t. extimus* (Unitt 1987).

METHODS

I conducted the study from 1 June through 15 August 1987 on The Nature Conservancy's Kern River Preserve, on the south fork of the Kern River upstream from Lake Isabella, Kern County, California. It includes a large area of mature riparian forest dominated by cottonwoods (*Populus fremontii*) and willows (*Salix laevigata* and *S. gooddingii*). I studied nesting success of Willow Flycatchers at two locations on the preserve: Mariposa Marsh, a marsh and willow thicket draining into the Kern River, and Slough Channel No. 4, a willow-lined slough near the preserve headquarters. Both sites are at 822 m (2630 feet) elevation.

At both sites the home ranges of singing males were searched for females and nests daily. I identified 12 territories based on daily observations of locations of singing males and the consistent use of specific singing perches throughout the breeding season. I checked nests three or four times weekly, minimizing the duration of nest checks. I noted the activities of the nesting pair (nest construction, brooding, response to parasitism, feeding of young) and observed the nest contents by using a small automobile side-mirror mounted on a pole. If an adult was sitting on a nest, I did not disturb the nest. I noted the plant species in which each nest was located, nest construction material, height of the nest over ground or water, distance to the edge of the willow clump, distance to the canopy top, and the percentage of ground covered with standing water in the pair's home range. I

collected these data after nesting was completed or the nest was abandoned.

RESULTS

Nests

Moist, low-lying areas and sloughs with dense willow thickets were the Willow Flycatcher's preferred nesting habitat. Many nests were around the ponds created by beaver dams. The nesting and foraging activities of Willow Flycatchers were frequently concentrated in openings within the canopy of willow thickets.

I located nests on 8 of the 12 territories. On three of the other territories, no nests or females were located despite repeated, intensive searching. Males in these territories also disappeared from the area earlier in the season than did males with nests, suggesting that the former were unmated. On the remaining territory, movements and vocalizations of the male suggested the presence of a female, but no nest was found. In addition to the nests at my two principal sites, I located another nest adjacent to the main river channel near the preserve headquarters and monitored the nest for the final three weeks of the study.

Table 1 Characteristics of Willow Flycatcher Nests

Subspecies[a]	Location	Nest Substrate	Mean and Range of Nest Height (m)	*N*	Source
E.t. traillii	Michigan	Dogwood (48%) Willow (15%) Elderberry (12%)	1.33 (0.61–2.82)	93	Walkinshaw (1966)
E.t. traillii	Ohio/ Nebraska	Dogwood (39%) Hawthorn (18%) Willow (12%)	1.37 (0.72–2.78)	80	Holcomb (1972)
E.t. brewsteri	British Columbia	Willow, Rose, Dogwood[b]	1.14 (0.68–2.62)	26	Stein (1963)
E.t. brewsteri	California	Willow (100%)	1.14 (0.70–1.75)	20	Sanders and Flett (1989)
E.t. brewsteri	California	Willow, Dogwood, Azalea[b]	1.49 (0.77–2.18)	22	Valentine et al. (1988, pers. comm.)
E.t. extimus	Entire range[c]	Willow (86%)	2.3 (0.60–5.50)	172	Unitt (1987)
E.t. extimus	Arizona	Tamarisk (100%)	3.3[d] (1.50–4.50)	12	Brown (1988)
E.t. extimus	California	Willow (100%)	2.52 (1.00–6.40)	19	This study

[a]Subspecific identity where not provided by the source was determined with reference to the review of Unitt (1987).
[b]Listed in order of importance from most frequently used to least frequently used.
[c]Review of nest characteristics from egg collection data throughout the subspecies' range in the southwestern U.S.
[d]Median nest height.

Table 2 Rates of Brood Parasitism and Acceptance of Cowbird Eggs by Willow Flycatchers[a]

Subspecies[b]	Location	Habitat	Parasitism Rate	Acceptance Rate	Source
E.t. adastus	Washington	Riparian willow/ Floodplain forest	4.5% (2/44)	50.0% (1/2)	King (1955)
E.t. adastus	Colorado	Riparian willow	40.7% (11/27)	18.2% (2/11)	Sedgwick and Knopf (1988)
E.t. traillii	Ohio Nebraska	Oldfields, hedges/ Riparian thickets	8.0% (7/88)	42.9% (3/7)	Holcomb (1972)
E.t. traillii	Michigan	Cornus/Elderberry/ Willow thickets	5.3% (5/94)	40.0% (2/5)	Walkinshaw (1966)
E.t. traillii	Michigan	Cornus/Elderberry/ Willow thickets	10.1% (33/325)	72.7% (24/33)	Berger (1967)
E.t. brewsteri	California	Montane meadow/ Willow thickets	0% (0/20)	—	Valentine et al. (1988)
E.t. brewsteri	California	Montane meadow/ Willow thickets	4.8% (1/21)	100% (1/1)	Sanders and Flett (1989)
E.t. extimus	Arizona	Riparian tamarisk	50.0% (4/8)	0% (0/4)	Brown (1988)
E.t. extimus	California	Riparian willow	68.0% (13/19)	46.2% (6/13)[c]	This study

[a]Studies conducted before the split of Willow and Alder Flycatchers are included only if the author clearly indicated that birds of the "fitz-bew" song type were involved.
[b]Subspecific identity where not provided by the source was determined with reference to the review of Unitt (1987).
[c]Cowbird eggs appeared in two of these nests after the hatching of Willow Flycatcher young.

I found 19 nests on the 8 territories, an average of 2.4 (range 1–6) nests per territory. Incidences of multiple nests within territories were all due to renesting attempts. All nests were in willows, mostly between forked branches (nesting has been reported recently in other plant species on the preserve, M. Whitfield pers. comm.). Nests were constructed of thistle fibers, strands of dried willow bark, grasses, animal hair, and the fluffy "cotton" borne by willow seeds. The average nest height was 2.52 m (±1.39 standard deviation, range 1.0–6.4 m). The average distance from the nest to the top of the canopy above the nest was 4.82 m (±2.89 s.d., range 1.0–10.5 m). The average distance to the outer perimeter of the willow clump containing the nest was 7.03 m (±4.27 s.d., range 1.0–15 m).

Seventy-four percent (14 of 19) of the nests were over water or mud. The summer of 1987 was very dry; all nests would have been over water during the previous year. All nests but one were near beaver ponds; the exception was the only nest more than 4 meters from water. The percentage of each territory covered by standing water at the beginning of the summer ranged from 70 to 100%.

Cowbird Parasitism

Thirteen of the nineteen nests (68%) were parasitized on seven of eight (88%) territories (Table 3). Three nests (16%) were unparasitized. Three (16%) were abandoned for unknown causes. Of these three nests with unknown fates, one loss coincided with heavy winds that apparently knocked down the nest. Two of the nests could have been parasitized; one of these was dismantled to construct a new nest, a behavior frequently observed with parasitized nests. Thus up to 80% of nests may have been parasitized.

Parasitized nests suffered a variety of fates (Table 3). Seven of the 13 parasitized nests (53%) were abandoned, with abandonment occurring on four of eight territories. In at least five of these cases the female dismantled the abandoned nest, using the material to build the next nest. The extreme case was exemplified by a pair at Mariposa Marsh that constructed six successive nests, finally fledging three young from the sixth nest. Three parasitized nests each fledged one cowbird and no flycatchers. One parasitized nest had two cowbirds near fledging when it was destroyed by an owl. Two nests parasitized late in the season successfully fledged Willow Flycatchers and no cowbirds. In one of these cases, a single cowbird egg was laid in a nest with four healthy nestling flycatchers (about 1 week old); one Willow Flycatcher nestling disappeared at this time, but three were fledged on 8 July. This was probably the first nesting attempt by this pair of Willow Flycatchers. In the other case, a second nesting attempt, a single cowbird egg was laid at about the flycatcher's hatching date (30 June). In this nest, one flycatcher egg was apparently removed at the time of parasitism, one nestling flycatcher was unusually small and died, the third nestling fledged on 15 July, and the cowbird egg did not hatch.

The three unparasitized nests were all successful. All of these nests were renesting attempts (second, third, and sixth attempts), fledging one, two, and three young, respectively. The sixth nest of a pair at Mariposa Marsh

Table 3 Fates of Willow Flycatcher Nests in the Kern River Preserve, 1987

Territory	Nest Number[a]	Flycatcher Eggs	Cowbird Eggs	Nest Fate (Fledge Date)
Slough Channel B	1	1	2	Abandoned (14 July)[b]
	2	2	1	Abandoned
	3	3	0	Fledged two flycatchers (13 August)
Slough Channel D	1	2	2	Lost to predator 9 July
	2	2	1	Fledged one cowbird (8 August)
Mariposa Marsh A	1	3	1	Abandoned (5 July)[b]
	2	1	1	Abandoned
	3	4	1	Abandoned
	4	?	?	Abandoned
	5	?	1	Abandoned
	6	3	0	Fledged 3 flycatchers (9 August)
Mariposa Marsh C	1	3	?	Abandoned
	2	1	0	Fledged 1 flycatcher (22 July)
Mariposa Marsh E	1	?	1	Abandoned
	2	3	1	Fledged 1 flycatcher (15 July)
Mariposa Marsh G	1	4	1	Fledged 3 flycatchers (8 July)
	2	2	1	Fledged 1 cowbird (10 August)[b,c]
Mariposa Marsh F	1	4	0	Probably knocked down by wind
River Channel A	1	1	1	Fledged 1 cowbird (30 July)

[a]In sequence of construction.
[b]Estimated date when young would have fledged from initial nests had nest not been abandoned.
[c]As the adults were not banded, the two successful broods in this territory may have had different parents.

fledged three young on 9 August. The young from their first nest would have fledged on 3 or 4 July. The second nest of a pair at Mariposa Marsh never had more than one egg. The single young fledged on 22 July. The young from this pair's first nest would have fledged on 7 or 8 July. The third successful unparasitized nest was along the Slough Channel and was the pair's third nesting attempt. This nest had three eggs, one of which did not hatch. The two young fledged on 13 August. Young from the first nest would have fledged on 12 or 13 July.

Three young cowbirds fledged from the 13 parasitized nests, an egg success rate of 20% (3 of 15 eggs).

DISCUSSION

Nests

Willow Flycatcher nests in this study were similar in their mode of construction and supporting plant species to those previously described in the literature (Table 1). Throughout its range, the Willow Flycatcher uses a variety of riparian shrubs and trees, principally willows (*Salix* spp.) and dogwoods (*Cornus* spp.). Nests are open cups supported by slender branches.

Some nest characteristics measured on the Kern River Preserve differ from those in other habitats (Table 1). The nest heights I observed in this study were within the range for the species, but higher than those in California montane meadow habitats (Table 1). The differences in nest height between my results and those of Sanders and Flett (1989) ($t = 4.31$, df = 37, $p < 0.05$) and Valentine et al. (1988) ($t = 3.32$, df = 39, $p < 0.05$) are both significant, reflecting the difference in height between the short, shrubby willows of montane meadows and the larger willows characteristic of a mature riparian forest.

The distance from the nest to the top of the willow canopy above the nest also differed from that reported in the literature, apparently for similar reasons. In my study, this distance (4.82 m, range 1–10.5 m) was substantially larger than that reported in montane meadows of the Little Truckee River (0.96 m, range 0.5–1.5 m, Sanders and Flett 1989) or the Shaver Lake region (1.19 m, range 0.51–1.85 m, Valentine et al. 1988). These differences are significant for both the Little Truckee River ($t = 6.03$, df = 37, $p < 0.01$) and the Shaver Lake region ($t = 5.29$, df = 35, $p < 0.01$).

Another interesting contrast is provided by measurements of the distance from the nest to the outer perimeter of the willow clump. Willow Flycatchers construct their nests near the edge of willow clumps or near streams (King 1955, Kings River Conservation District 1985, Flett and Sanders 1987, Valentine et al. 1988). In my study, the distance to the nearest willow clump edge was greater (7.03 m, range 1–15 m), than that observed on the Little Truckee River (2.3 m, range 0.6–7.5 m, $t = 4.64$, df = 37, $p < 0.01$, Sanders and Flett 1989). This difference also reflects habitat differences; on the Kern River, Willow Flycatcher nests were in large openings under the willow canopy, thus they could be near an edge within the canopy but far from the outer edge of the willow clump. Therefore a different nest microhabitat results from similar behavior in structurally different habitats.

In montane meadows, the habit of constructing nests near the edges of willow clumps or near cattle trails (Sanders and Flett 1989) places Willow Flycatcher nests at risk from destruction by browsing livestock or by wind (Stafford and Valentine 1985, Taylor and Littlefield 1986, Valentine et al. 1988, Sanders and Flett 1989). On the Kern River and in similar riparian habitats, the placement of nests in spaces within the canopy may reduce the risk of knockdown, particularly if the depth of water beneath the nests discourages cattle use of the habitat.

Nest Success and Cowbird Parasitism

The Willow Flycatcher is subject to severe brood-parasitism by Brown-headed Cowbirds on the Kern River. The rate of nest parasitism, at least 68%, was higher than any previously reported (Table 2), but is similar in magnitude to rates observed along the Colorado River (Brown 1988) and in montane riparian habitat in Colorado (Sedgwick and Knopf 1988). These studies and my results refute the suggestion by Friedman et al. (1977) that western Willow Flycatchers are parasitized at rates lower than are eastern populations. High parasitism rates for Willow Flycatchers nesting in lowland southwestern riparian habitats are also supported by anecdotal historical data and egg collections (Hanna 1928, Rowley 1930, Friedman 1963), and by the coincidence of the species' decline with the spread of cowbirds in California (Gaines 1974, Laymon 1987).

Brood parasitism was the leading cause of nest failure during my study. Six young flycatchers fledged from three unparasitized nests, while four fledged from two of 13 parasitized nests. Thus ten Willow Flycatchers fledged on the eight territories with nests: a rate of 1.25 young per nesting pair or 0.83 per singing male detected in my study area. Forty-one Willow Flycatcher eggs were found in the study areas; thus the egg success rate was 24.4%. However, other eggs were probably removed, because unparasitized Willow Flycatcher clutches usually contain three or four eggs (King 1955, Walkinshaw 1966, Holcomb 1972, Kings River Conservation District 1985). I estimate that a minimum of eight additional eggs may have been removed, so the actual egg success rate was probably closer to 20%. This egg success rate is lower than that in midwestern populations parasitized at lower rates. Egg-to-fledging success rates of 81.4% (Berger 1967) and 65.6% (Walkinshaw 1966) have been reported from populations with parasitism rates of 10.1% and 5.3%, respectively. King (1955) reported a fledging success rate of 44.6% of hatched eggs from a population with a 4.5% parasitism rate. The percentage of nests fledging young from the heavily parasitized population (40.7%) in Colorado was a surprisingly high 40.7%. Successful renesting following abandonment of parasitized nests was responsible for this success rate (Sedgwick and Knopf 1988), but the overall egg success rate may have been lower, as renesting attempts usually result in smaller clutches (Holcomb 1974).

Successful Willow Flycatcher broods may have been negatively affected by the delays in fledging date caused by abandonment and renesting. Fledging dates ranged from 11 July to 13 August. Estimated or actual fledging dates of initial nesting attempts were from 1 to 15 July. Cowbird

parasitism resulted in fledging dates for renesting attempts of 1 to 15 August. Thus successful nesting of parasitized Willow Flycatchers was delayed by 2–4 weeks. Delay in fledging date could result in poor preparation for migration. Alternatively, late fledging may be an indication that Willow Flycatchers could produce two broods within a season if unparasitized (M. Whitfield, pers. comm.), although double broods have not been reported previously.

Other causes of nest failure may lower nest success rates to levels similar to that of this study. On the Little Truckee River, a mid-July snow storm was the primary cause of mortality during 1987, a year in which only 19% egg-to-fledging success was achieved (Flett and Sanders 1987, Sanders and Flett 1989). During the previous year, the success rate was 45%. Stafford and Valentine (1985), and Valentine et al. (1988) reported egg-to-fledging rates of 25% and 38% in two different years in the Shaver Lake area, Fresno County. Primary sources of egg failure were livestock knocking down nests and egg inviability. Clearly Willow Flycatcher populations may be limited by different factors depending on location and habitat. Brown-headed Cowbird brood parasitism may often be the most important limiting factor in low-elevation riparian habitats like the Kern River Preserve.

The most common response by Willow Flycatchers to brood parasitism in this study was abandonment of parasitized nests, followed by attempts to renest (7 of 13 parasitized nests). Nest abandonment in response to brood parasitism has also been reported in most other studies of cowbird-parasitized Willow Flycatchers (King 1955, Berger 1967, Holcomb 1972, 1974, Brown 1988, Sedgwick and Knopf 1988). Abandonment appears to be a beneficial strategy in that renesting attempts may eventually avoid parasitism (Sedgwick and Knopf 1988, this study), but the effects of the delay in fledging date are unknown. Some studies have reported burial of the cowbird eggs or construction of a new nest bottom over cowbird eggs (Walkinshaw 1966, Berger 1967, Holcomb 1972, Brown 1988, Sedgwick and Knopf 1988), although this response is never as frequent as nest abandonment or acceptance of cowbird eggs. Brown (1988) reported possible rejection of cowbird eggs based on discovery of cowbird egg fragments below a Willow Flycatcher nest. Comparison of reported acceptance rates is difficult because of differences between studies in the frequency of nest observation and because of small sample sizes in some studies (Table 2). Populations parasitized at a higher rate (>15%), however, accept cowbird eggs less often (8 of 28 nests, 28.6%) than those parasitized at a lower rate (31 of 48 nests, 64.6%). This difference is significant (X^2 = 8.15, df = 1, $p < .005$), suggesting that abandonment and other responses may become more likely as the parasitism rate in a population increases. Proximate mechanisms for such behavior remain unknown for this host species.

This study supports the hypothesis that parasitism in the Sierra Nevada may be indirectly related to elevation (Rothstein et al. 1980, Stafford and Valentine 1985). The parasitism rate observed on the Kern River Preserve differed sharply (Table 2) from that observed during two years of study in the Little Truckee River region (elevation 2010 m, Flett and Sanders 1987, Sanders and Flett 1989), and several years in the Shaver Lake region

(elevation 1731–2097 m, Kings River Conservation District 1985, Stafford and Valentine 1985, Valentine et al. 1988). Only a single parasitized nest was found during these two studies. This low parasitism rate has been hypothesized to result from the mid-July exodus of Brown-headed Cowbirds from high elevations combined with mid-summer breeding of the Willow Flycatcher in California (Rothstein et al. 1980, Verner and Ritter 1983, Stafford and Valentine 1985). The studies near Shaver Lake indicated that Brown-headed Cowbird egg-laying preceded the arrival and nesting of most Willow Flycatchers. Farther south and at lower elevations, cowbirds may be resident for longer periods and have more extended breeding seasons (Rothstein et al. 1980, Laymon 1987), and Willow Flycatchers arrive earlier in the spring (Garrett and Dunn 1981). Along the Kern River, Brown-headed Cowbirds decrease by the end of July (S. Laymon pers. comm.). Cowbird egg-laying took place from 9 to 20 July during my study, overlapping the flycatcher's initial nesting attempts.

Management Implications

The very high rate of Brown-headed Cowbird parasitism and low egg success rate of Willow Flycatchers at the Kern River Preserve during 1987 suggests that brood parasitism may affect the ability of Willow Flycatchers to recolonize or increase in lowland riparian habitat, even if efforts are made to restore suitable habitat. The population at the Kern River Preserve seems not to have fully occupied the suitable habitat present. Such a high parasitism rate is of great concern because of the endangered status of the species in California and of the subspecies *E. t. extimus* throughout its range (Unitt 1987).

Possible management strategies to reduce Brown-headed Cowbird parasitism include trapping of cowbirds and managing habitat to reduce cowbird feeding opportunities and success rate. Trapping of cowbirds may be an effective short-term strategy where cowbirds concentrate (Mayfield 1977b, Goldwasser et al. 1980, Laymon 1987). Willow Flycatchers increased from 5 to 17 singing males from 1981 to 1986 during a cowbird removal program designed to benefit the Least Bell's Vireo (*Vireo bellii pusillus*) on the Santa Margarita River, San Diego County (Unitt 1987). Because of the intensive effort and cost of such a program, this strategy should be applied where conditions contribute to success of trapping and where there are key populations of threatened species. At the Kern River Preserve the cowbird's feeding and nesting areas are adjacent, concentrating the cowbirds in a relatively small area and favoring trapping success. On the other hand, the surrounding habitat is arid and probably the density of hosts in it is much lower, so cowbirds may travel from a considerable distance (Rothstein et al. 1984) to search for hosts in the high-quality riparian habitat of the preserve. It might be difficult to remove enough cowbirds to reduce parasitism rates if the cowbirds are traveling to the preserve from great distances. In the short run, cowbird trapping and egg removal should be implemented to relieve Willow Flycatcher populations and evaluate the effect of Brown-headed Cowbirds on fledging success and population density.

Habitat management represents the best long-term strategy for cowbird control. Fragmentation and disturbance of habitat are associated with

higher parasitism rates (Rothstein et al. 1980, Brittingham and Temple 1983, Airola 1986). The linear nature of riparian habitat patches make the nests of riparian birds especially vulnerable to cowbirds (Bleitz 1956, Laymon 1987). Most willow thickets at the Kern River Preserve are close to very short grazed grassland or stubblefields. Increasing the width of riparian corridors by revegetation and reducing grazing in the vicinity of the riparian strip is an ongoing process at the preserve that will allow the usefulness of riparian habitat modification in reducing parasitism to be evaluated. Reduction of grazing intensity would allow grasses to grow to a height that inhibits the cowbird's foraging. Further benefits in areas where low willows provide nesting habitat (M. Whitfield pers. comm.) would include reduction of browsing and disturbance of foliage at the height of Willow Flycatcher's nests (Stafford and Valentine 1985, Flett and Sanders 1987, Valentine et al. 1988).

SUMMARY

This study shows that the Willow Flycatcher's nesting microhabitat and nest characteristics in lowland riparian forests differ from those in montane meadows. Nests on my study area were higher and tended to be located within the willow canopy, on the edge of within-canopy spaces. These differences are probably due to the difference between my study area and montane meadow sites in height and canopy structure of willows.

Willow Flycatchers on the Kern River are subject to a high rate of brood parasitism by Brown-headed Cowbird. Brood parasitism occurred in at least 68% of nests and was the leading cause of nest failure during my study. As a result, the overall egg success rate was low (at most 24.4%). The most common response of Willow Flycatchers to parasitism was abandonment of the nest followed by renesting attempts. This strategy was often successful, but fledging dates for some pairs were delayed two to four weeks.

My study supports the hypothesis that Brown-headed Cowbird brood parasitism rate is indirectly related to elevation. Overlap between the breeding seasons of Brown-headed Cowbirds and Willow Flycatchers is greater on the Kern River than at higher-elevation montane meadows, where cowbirds tend to depart near the beginning of flycatcher nesting.

The high rate of cowbird parasitism observed in my study is of concern because of the endangered status of the Willow Flycatcher. Possible management strategies to alleviate this situation include habitat restoration, reduction of grazing to reduce cowbird feeding habitat and nest destruction, and cowbird trapping. Habitat restoration and reduction of grazing are preferred long-term strategies, because they reduce the suitability of habitats for cowbird feeding near riparian areas and because they hinder the ability of cowbirds to locate hosts by reducing the amount of habitat edge relative to habitat area. Trapping of cowbirds or egg removal may be useful short-term strategies to provide immediate relief to critical populations of Willow Flycatchers.

Questions remaining for future study include the effect on parasitism rate of habitat differences within lowland riparian forests, differences in parasitism rates between natural and artificial revegetation sites, and the extent

of year-to-year variation in parasitism. These issues, which could influence management strategies for the species, may be clarified by ongoing studies at the Kern River Preserve (M. Whitfield, pers. comm.).

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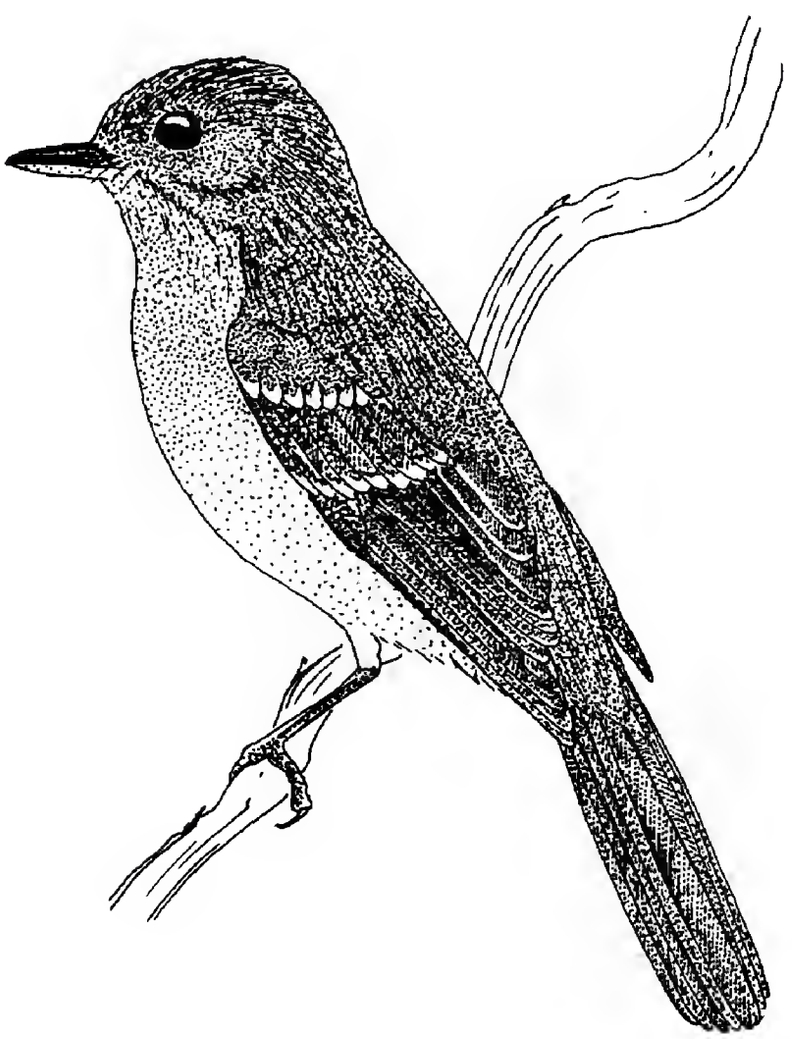

Willow Flycatcher *Sketch by Eric Lichtwardt*

BREEDING BIRDS OF LAGUNA FIGUEROA AND LA PINTA POND, BAJA CALIFORNIA, MEXICO

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Coastal lagoons, with their adjacent beaches, salt marshes, and mudflats, are important habitats for numerous birds, including terns and shorebirds. These habitats are used by both migratory and resident species, the former including not only those present during the winter, but also those that reproduce in the area. The future of these habitats is threatened by the ever-increasing impacts of residential and recreational development. In California, two of the bird species that have been most directly affected by the loss or reduction of these habitats are the Snowy Plover (*Charadrius alexandrinus nivosus*) and the California Least Tern (*Sterna antillarium browni*). In Baja California, coastal lagoons harbor important breeding populations of these species, but, even here, the colonies are being directly affected by the off-road vehicles and pets of tourists. As indicated by Atwood (1987), their habitat, besides these individual species, should be considered endangered. Accordingly, it is important to inventory the present extent and utilization of these habitats before additional plans to develop them are approved and carried out. We present here a survey of the breeding birds of two such coastal wetlands, Laguna Figueroa and La Pinta Pond, Baja California.

Laguna Figueroa, also known as Laguna Mormona, is located 163 km south of Ensenada, between Colonia Guerrero and San Quintín. It is a long, closed, hypersaline lagoon, separated from the ocean by a barrier dune ridge 20 km long, 100 - 150 m wide, and 8 - 12 m high. The lagoon extends inland 0.5 - 2.5 km from this barrier dune (Horodyski 1977, Horodisky et al. 1977, Margulis et al. 1983). The wetland includes a narrow band of marsh and a large salt flat (Figure 1). The northern part of the marsh consists of two types of habitats: an inundated area of relatively tall intermediate marsh composed of annual pickleweed (*Salicornia bigelovii*) and saltwort (*Batis maritima*), and a non-inundated area of relatively low upper marsh composed of shoregrass (*Monanthochloe littoralis*), saltgrass (*Distichlis spicata*), and pickleweed (*Salicornia subterminalis*).

Although the tides are the primary influence on the lagoon's water level, the variations are largely damped out by percolation through the barrier dune. There are both permanent and ephemeral ponds, varying in diameter from a few meters to several hundred meters, and in depth from a few centimeters to several decimeters (Horodyski 1977). Runoff rain water also contributes to this lagoon during the November - March rainy season.

There are, in Baja California, several other small largely unstudied lagoons. La Pinta Pond is one such small closed lagoon approximately 53 km south of Laguna Figueroa, in the northeastern part of Bahia de Santa Maria, and 500 m north of Hotel La Pinta - San Quintín (Figure 1). This lagoon is bordered by middle marsh species, mainly pickleweed (*S. virginica*), and includes a small island 9.5 m long and 6.3 m wide, also covered by this vegetation.

We surveyed both lagoons on 13 and 14 June and from 4 to 6 July 1990 as part of our study of nesting Least Terns. During these visits we also recorded nesting by other species, described below.

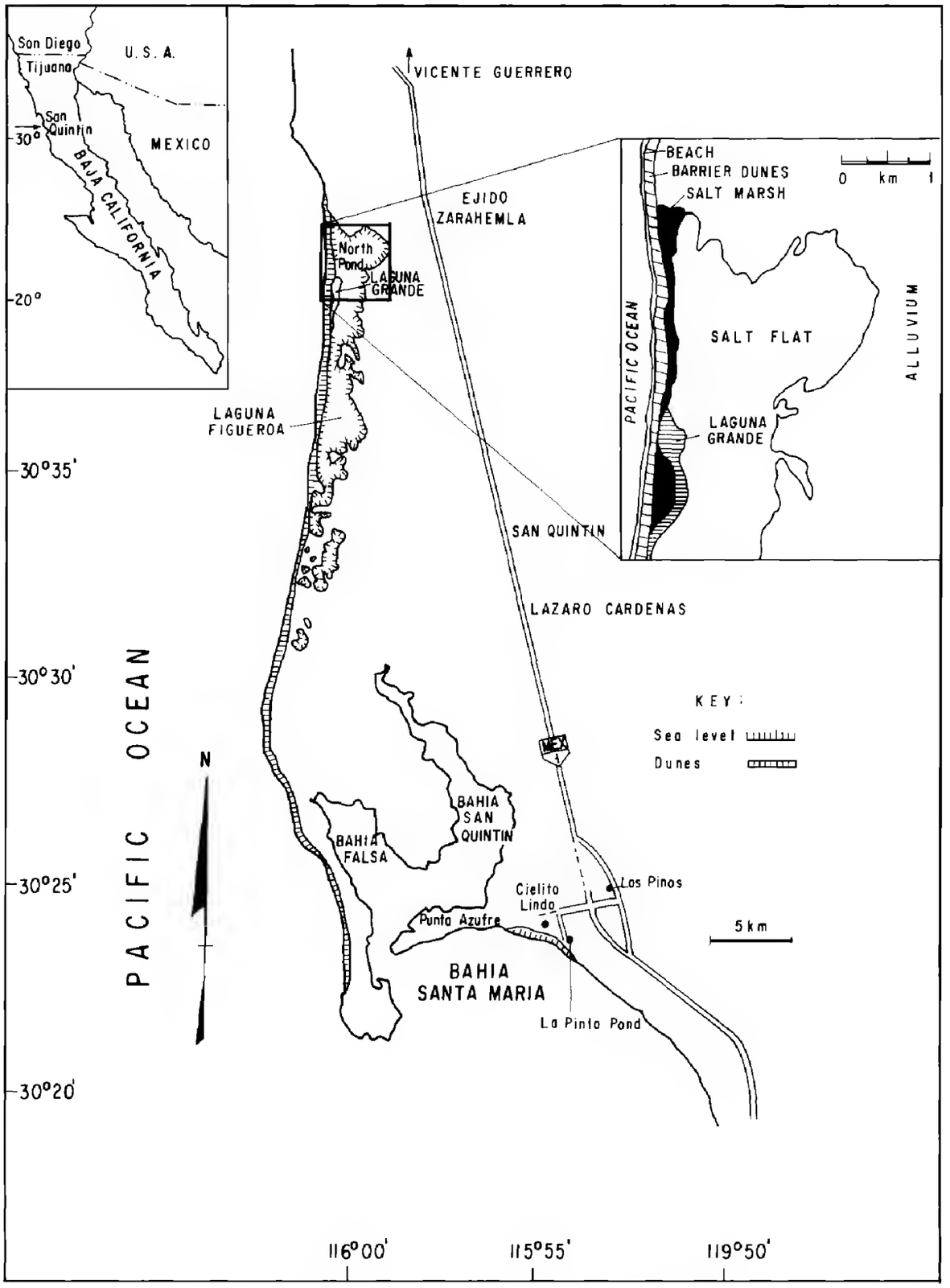

Figure 1. Locations of Laguna Figueroa (Laguna Mormona) and La Pinta Pond, Baja California, Mexico.

SPECIES ACCOUNTS

Snowy Plover (*Charadrius alexandrinus*): We found 15 pairs at Laguna Figueroa. During our first visit one pair on the northern pond had three chicks. There were four active nests in the area between the salt flat and the open marsh, together with nesting Least Terns. The plover nests were widely separated, with an average distance between them of about 100 m. The average clutch was 2.75 eggs. By our second visit, all the eggs recorded on the first visit had presumably hatched, as we found four empty nests plus one active nest with three eggs, and four egg shells. We did not detect any chicks. This breeding population, of at least 30 individuals, is probably augmented by the arrival of migrants during the winter, as at Estero de Punta Banda, Baja California (Palacios et al. in press), Bolinas Lagoon, California (Page *et al.* 1979), and elsewhere along the Pacific coast. In La Pinta Pond we observed two pairs of these plovers, one of them running before us in a distraction display. We found also an empty nest on the dry mud flat. The Snowy Plover also nests along the sandy beach of Punta Azufre (Figure 1) in Bahia San Quintin, and it was previously recorded breeding at Laguna Figueroa by Anderson and Kelly (1980).

Killdeer (*Charadrius vociferus*): At each of the two sites we found one pair, both performing the broken-wing distraction display. We didn't find any nests, eggs, or chicks.

Black-necked Stilt (*Himantopus mexicanus*): We saw three pairs in the area of closed marsh at each site. They exhibited typical distraction behavior, crying and flying near us, landing about 20 m from us and vigorously flapping their winds, and feigning incubation while others foraged nervously at the side of the pond. We found two empty nests during our first visit to Laguna Figueroa. These were built of dry branches of pickleweed and formed floating rafts.

In La Pinta Pond we found one pair with three chicks not yet fledged, two empty nests, and an egg shell. Here the nests were built in depressions in dry mud, lightly lined and covered with plant material. By mid-June any young would have fledged.

American Avocet (*Recurvirostra americana*): In Laguna Figueroa we found only three pairs of avocets but six active nests. One had two recently hatched chicks, and the others contained eggs. The average nest diameter was 150 mm (range 120-150 mm, $n = 5$) and the average clutch size was 2.5 eggs (range 1-4 eggs, $n = 5$). The measurements of four eggs averaged 52.1 by 33.9 mm; the eggs showing the four extremes measured **53.6** by 33.5, 52.0 by **34.6**, **51.0** by 33.4, and 51.0 by **33.4** mm. The nests were located on floating rafts of dry vegetation, in the channels of the closed marsh. During the second visit we found that 9 out of 11 eggs in five marked nests had hatched. One active nest still had four eggs; we also found two broken eggs. Anderson and Kelly (1980) also recorded avocets breeding at Laguna Figueroa.

In La Pinta Pond we found one nest with three eggs in a depression in the dry mud flat. It had dry branches in the bottom and around the edges. We also found one empty nest and three pairs of adults in breeding plumage, one near the active nest and the other two feeding in the lagoon.

Forster's Tern (*Sterna forsteri*): We saw 15 pairs, 10 active nests, and 7 empty nests at Laguna Figueroa. During the first visit we found one one-day-old

chick in a nest, probably one of the first of the season. The average clutch size was two (range 1 - 3 eggs, $n = 10$). The colony was in the area of closed marsh, together with the avocets and stilts. The nests were made out of dry branches, placed on vegetated islets (from 1 to 3 m in diameter), and almost completely surrounded by water. The average diameter of the nests was 120 mm (range 100 - 130 mm, $n = 10$). The distance between nests averaged 6.55 m (range 2.0 - 12 mm, $n = 8$). Thirteen of the 18 eggs in nests recorded on the first visit hatched. We found five eggs broken by predators, probably birds. Western Gulls (*Larus occidentalis*) were the only avian predator seen; both tern species mobbed them vigorously. There were also Coyote (*Canis latrans*) tracks near the nests.

During the first visit to La Pinta Pond we found 15 breeding pairs and 11 active nests: one with one egg, five with two, and five with three. We collected three eggs that had rolled out of their nests, next to the islet. A pair was observed copulating on the side of the lagoon. By the second visit, 12 of the 26 eggs in the nests recorded on the first visit had hatched, while 14 were still in the nests, probably still viable. Moreover, four nests were built after the first visit, two with two eggs and two with three. The nest that had lost two eggs out of three, at the time of the first visit, had two new eggs.

Nine eggs that were measured averaged 42.89 by 30.11 mm; the eggs showing the four extremes measured **44,5** by 30.4, **39.4** by 29.6, 44.0 by **30.5**, and 42.5 by **29.0** mm. The nests were well defined and round, and consisted of a depression in the bare ground, lined and covered with dry branches. All but one of the nests were located around the islet on the beach between the vegetation and the water; a single nest was in an open space in the middle of the islet. The average distance between nests was 2 m (range 1.8 - 3.0 m, $n = 11$).

We also collected five juvenile perch (*Hyperprosopon argenteum*), measuring 76 mm long, that were on the ground in the midst of the nesting area. Such dropped fish indicate the diet of terns during their reproductive season (Atwood and Kelly 1984). Although there are summer records of Forster's Terns at San Quintín and El Rosario (Grinnell 1928, Wilbur 1987), our observations are the first of breeding for this species in the peninsula of Baja California, and constitute a southward extension of its breeding range of about 300 km (3°) from San Diego Bay, California. So La Pinta Pond becomes the southernmost known colony of the species on the Pacific coast.

Least Tern (*Sterna antillarum*). In Laguna Figueroa we found 10 pairs behaving aggressively and feeding young. During the first visit we found a nest with an egg that had been broken by an off-road vehicle, as well as three chicks (estimated ages 7, 7, and 11 days) in the open marsh area. During the second visit we found one active nest with one egg, and two chicks (estimated ages 5 and 8 days). Approximately 70% of the colony area was marked by recent tracks of off-road vehicles. The second nest probably represented a second nesting attempt of an unsuccessful pair, because the composition of a second nesting wave at a given colony could depend upon the success of the first wave, both there and at nearby sites (Massey and Atwood 1981). This colony represents an addition to the list of known colonies of the Least Tern in Baja California (Palacios and Mendoza, unpubl. data).

At La Pinta Pond we did not find any Least Terns, although they nest about 6.8 km to the west, on Punta Azufre (Figure 1) (Massey 1977, Palacios and

Escofet 1990). The absence of the species at this site can be explained by the lack of suitable habitat.

DISCUSSION

In addition to the endangered California Least Tern and the troubled Snowy Plover, Laguna Figueroa has also a population of Belding's Savannah Sparrow (*Passerculus sandwichensis beldingi*), endangered to the north in California. No attempt was made to census this population as it was well past the peak of the breeding season. The presence of these three species, in addition to the other nesting species we recorded, make this area an important target for any conservation project. We agree with Anderson (1988) and Ibarra-Obando (1990) that it must be included in any conservation program involving the larger San Quintin area to the south. La Pinta Pond, being a nesting site for coastal birds, shows that more effort should be spent in the inventory, study, and protection of even small and seemingly unimportant coastal lagoons.

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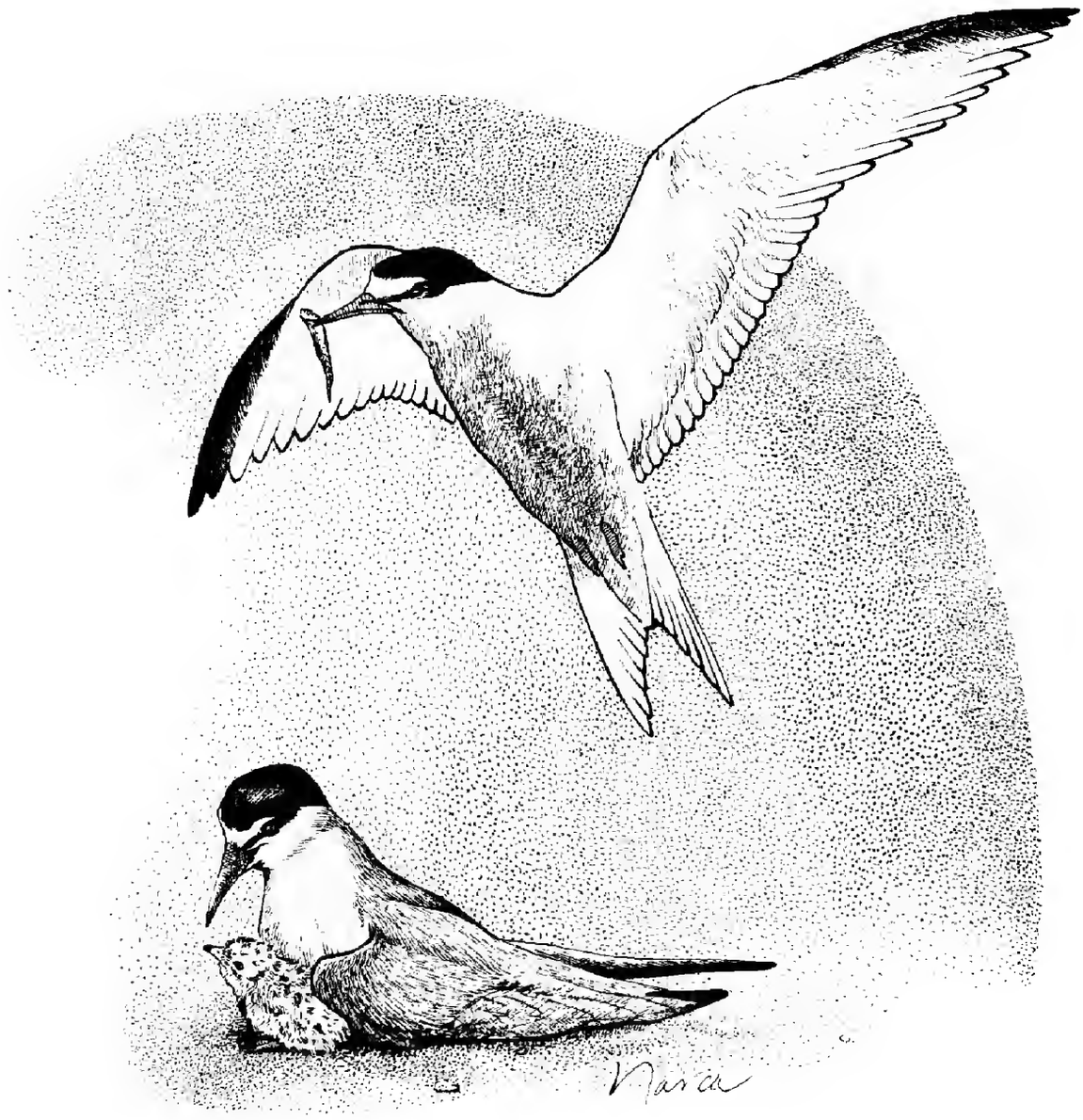

California Least Terns *Sketch by Narca Moore-Craig*

NOTES

A SHORT-TAILED ALBATROSS OBSERVED NEAR SAN BENEDICTO ISLAND, REVILLAGIGEDO ISLANDS, MEXICO

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On 29 April 1990, at 1500, while on a 73-foot motor yacht cruising the eastern Pacific Ocean at 19°26'N, 110°44'W (approximately 6 nautical miles north of San Benedicto Island, the northernmost of the Revillagigedo Islands of Mexico), Santaella spotted a large albatross about 200 meters from the boat. He immediately pointed out the bird to his companions, all experienced observers: Andrés and Pilar Sada, Eugenio Clariond, Miguel A. Gomez, Barbara M. Montes, and Mario A. Ramos. Having just seen two Laysan Albatrosses (*Diomedea immutabilis*), he initially thought that the approaching bird would be another Laysan. When clearly seen, however, the bird was unmistakably an adult Short-tailed Albatross (*Diomedea albatrus*). We all saw the bird well with binoculars for about three minutes as it flew north low over the water in a leisurely but purposeful manner and disappeared into the distance. The weather was fair with light wind and swell and water temperature of 78°F.

The albatross was larger than the two Laysan Albatrosses we had just seen and had a huge pink bill. The head and body were white with a distinct yellow crown and nape. The wings above were black distally and proximally with black primaries and secondaries separated by a large white patch with irregular borders. The mantle and rump were pure white and the tail was black, with the pale feet projecting beyond it. The massive bill imparted to the bird a front-heavy appearance, as if it were prone to keel forward. The plumage and appearance of the adult Short-tailed Albatross are unique and quite distinct from those of any other of the world's albatrosses (Harrison 1983, 1987). The other two species of the northern Pacific Ocean, the Laysan and the Black-footed (*D. nigripes*), both found in Mexican waters, differ completely, the former having entirely blackish upper wings and mantle, and the latter being entirely dusky brown with black bill and feet. (The juvenile Short-tailed Albaross is entirely brown but retains the pink bill and pale feet.)

Our observation of a Short-tailed Albatross is the first reported for the Revillagigedo Islands. The only other albatross recently recorded from these islands is the Laysan, a recent colonizer (Howell and Webb 1990). Between 29 April and 6 May 1990 we observed two Laysan Albatrosses at sea off San Benedicto, one flying past Roca Partida, and four on landing on Clarión. There is a very old record of a Black-footed Albatross off Clarión Island (Anthony 1898). As far as we are aware, the only other record this century of a Short-tailed Albatross from Mexico is of an adult seen in November 1986 by David Ainley and Larry Spear 230 miles off Manzanillo, Colima (L. Spear pers. comm.). There are no recent reports for Baja California (Wilbur 1987), from where the species was regularly recorded prior to 1900 (Grinnell 1928). This albatross was formerly abundant in the North Pacific, breeding between October and May on numerous small islands off Japan and dispersing north to the Bering Sea and east to the coasts of California and Baja California (Harrison 1983). After the species was nearly exterminated by Japanese

plume-hunters in the late 19th and early 20th centuries, there are now approximately 250 birds breeding only on Torishima, off Japan (Hasegawa 1984), with a total population of about 400 (Ackerman 1990). There are about a dozen recent records from western North America, ranging from Alaska to California (Hasegawa and DeGange 1982, Everett 1983, Campbell et al. 1986). The only records since 1946 of *adult* Short-tailed Albatrosses off western North America south of Alaska are the two from Mexico reported here. Presumably, if the population continues to increase, the species should become more frequent off the Pacific coast of North America, including Mexico.

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TWO NEW RECORDS OF THE FLAMMULATED OWL (*OTUS FLAMMEOLUS*) IN THE SACRAMENTO VALLEY, CALIFORNIA

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Information on the migration of the Flammulated Owl (*Otus flammeolus*) in California is minimal (Bloom 1983, Winter 1974, Collins et al. 1986). This paucity of data is perhaps due to the species' strictly nocturnal habits and its habit of not calling during the fall, making detection very difficult (Winter 1974). The Flammulated Owl is found mainly in the Transition Zone of California, most often in forests of Ponderosa Pine (*Pinus ponderosa*), Sugar Pine (*Pinus lambertiana*), Douglas Fir (*Pseudotsuga menziesii*), White Fir (*Abies concolor*), Incense Cedar (*Calocedrus decurrens*), and Black Oak (*Quercus kelloggii*) (Winter 1974, 1979, Marcot and Hill 1980). The Flammulated Owl is almost exclusively insectivorous (Marshall 1957, Ross 1969, Goggans 1985) but rarely takes small vertebrates (Johnsgard 1988).

The Flammulated Owl is now known to be a long-distance migrant, wintering in Mexico and Central America (Balda et al. 1975, Collins et al. 1986, Winter 1974). There is only one winter record for California (Stephens 1902) and two for Arizona (Simpson and Werner 1958, Monson and Phillips 1981). In California the earliest spring record is 23 March (Marcot and Hill 1980) and the latest fall record is 31 October (Winter 1974). In addition, there is a number of records of vagrant Flammulated Owls occurring far outside their normal range (Collins et al. 1986).

There are two previous fall records for the California Central Valley and here I report an additional two. Both previous lowland (elevation 4 feet) occurrences have been at Davis, Yolo County, in October. The first was of an adult female found on the University of California at Davis campus on 31 October 1936 (Emlen 1936; wing chord 135.8 mm, tail 63.5 mm, weight unknown). This specimen is deposited in the Vertebrate Museum, Department of Zoology, University of California, Davis.

The second Flammulated Owl was found near Road 25A and Highway 113, Woodland, Yolo County, on 16 October 1974 (anonymous 1979). The owl was alive and taken to the School of Veterinary Medicine where it was examined and diagnosed as having bilateral cataracts of unknown etiology.

The two new records are also from Yolo County. One was of an adult found trapped inside a large storage building along Hutchinson Drive, University of California campus, on 11 October 1984. I caught the owl with a net and held it overnight for observation. All remiges and rectrices were complete and unworn; the wing chord measured 134 mm, the tail measured 57.6 mm, and the body weight was 78 grams. This weight suggests the owl was a female (Johnson and Russell 1962, Reynolds and Linkart 1984). I placed the owl in a flight chamber to evaluate its flight ability and fed it live crickets ad libitum. It was photographed (see cover), banded (U.S.F.W. NO. 1363-80789), and released in the evening of 12 October 1984 near South Putah Creek, Davis.

The fourth Flammulated Owl was found by a concerned citizen on 3 October 1988 in Woodland. The owl had been caught by the family cat and was treated for shock at the University of California Davis Raptor Center and Veterinary Medical Teaching Hospital. In spite of this care the owl died the following day. Postmorten diagnosis revealed a depression fracture of the left side of the skull, focal contusion of the left cerebral hemisphere, and pulmonary hemorrhage. The bird was hatching-year female weighing 60 grams, wing chord 133 mm, tail 55 mm. The specimen is deposited in the Department of Wildlife and Fisheries Biology Museum, University of California Davis, catalogue number MWFB 3227.

Notably, all four records of the Flammulated Owl for California's Central Valley are for October, suggesting that the species is a regular if rarely detected migrant during that month.

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A FALL RECORD OF THE SHARP-TAILED SPARROW FOR INTERIOR CALIFORNIA

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In the early morning of 22 September 1990 we, along with Thomas E. Wurster, observed a Sharp-tailed Sparrow (*Ammodramus caudacutus*) at Furnace Creek Ranch, Death Valley National Monument, Inyo County, California. It was seen feeding in the weeds and resting in the scrubby tamarisks surrounding a small pond in the northwestern corner of the golf course. The lack of wind and the warm and clear conditions allowed us to study the bird closely through binoculars for 20 minutes.

In size and shape the bird was like a Grasshopper Sparrow (*A. savannarum*), being small and chunky with a flat crown, having a short tail with pointed retrices, and flying weakly on short wings. The bill was mostly dark, conical, and rather fine. The most striking feature was the bright orange on the face and breast. The face was boldly patterned with a wide orange supercilium, which tapered to a point behind the eye, a distinctly contrasting mouse-gray auricular patch, orange lores, and a blackish postocular stripe that thickened as it approached the nape. Pale orange on the throat contrasted slightly with the brighter orange across the breast. Fine black streaks crossed the breast, although the center of the breast appeared to be unstreaked. Black streaking on the flanks was bolder and a bit heavier. The belly looked clean white; we never obtained a clear view of the undertail coverts. The crown was very dark, with a gray central stripe and black lateral crown stripes, although this gray central stripe was difficult to see since it was nearly as dark as the lateral crown stripes. The nape was unmarked mouse-gray, sharply offsetting the dark crown and back and the orange face. The back was deep blackish with bold white stripes. The wings were wholly warm grayish-brown with a trace of wingbars and darker tertials edged whitish. We never saw the rump well. All specimens from the Pacific Coast have been reported as *A. c. nelsoni* from central North America; our bird showed the indistinct breast streaks and the very bold back stripes characteristic of this subspecies. The similar race *A. c. altera*, which breeds around James Bay and winters along the Atlantic coast and the Gulf of Mexico, cannot be eliminated, however, although it is less likely to reach California.

The Sharp-tailed Sparrow breeds east of the Rocky Mountains throughout the prairie provinces of Canada and the north-central Great Plains of the United States, south to southeastern South Dakota. Disjunct breeding populations inhabit the Atlantic seaboard from southeastern Quebec south to North Carolina (A.O.U. 1983). The Atlantic populations are essentially resident, particularly from New York south. However, the populations breeding inland and around Hudson Bay migrate south to the Gulf of Mexico, wintering along the coast from Texas to southern Florida (A.O.U. 1983). In tidal marshes along the Pacific coast, small numbers have been found wintering annually in recent years, with records extending from Humboldt Bay, California (Morlan and Erickson 1988) south to Bahía de San Quintín, Baja California Norte (Northern 1962), and from 17 October to 6 May (Roberson 1980). Since the Sharp-tailed Sparrow has proved regular in California, the species was recently removed from the California Bird Records Committee (CBRC) review list (Dunn 1988).

Despite its extensive seasonal movements through the central United States, the species is seldom detected during migration. Even though it winters regularly in California, the Sharp-tailed Sparrow is "virtually unrecorded in the west away from coastal areas" (A.O.U. 1983). West of the Rocky Mountains, there are records only for California and Baja California. Montana and Colorado are the only other states west of the species' normal migration route for which there are valid records (DeSante and Pyle 1986).

In California, vagrants have been noted along the coast away from wintering localities on occasion, with the earliest being 29 - 30 September 1988 at the Santa Clara River estuary, Ventura County (McCaskie 1989). Inland, there are four records of spring vagrants, all from the deserts. Two of these records are for 1976, when single birds were observed at Oasis, Mono County, 25 - 26 May and at Furnace Creek Ranch 27 - 29 May (Garrett and Dunn 1981). The other two occurrences took place in Kern County during the spring of 1990: one was observed at Mojave 13 May and one was seen and photographed at Galileo Hill 20 - 24 May (McCaskie 1990). The only other record for the interior of California is unreviewed by the CBRC: one was reported on the Colorado River at Imperial Dam, Imperial County, 29 March 1975 (Garrett and Dunn 1981). This individual most probably wintered at this location. There are no previous fall records away from the coast. Thus, the 22 September sighting we report here is not only the first fall record for interior California, it is also the earliest for the state by a week.

We thank Philip Unitt and Jon Dunn for commenting on a draft of this note.

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GOLDEN EAGLES NEST ON CENTER-PIVOT IRRIGATION SYSTEM

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On 10 June 1990, Ken and Phil Luepke, Keith Merkel, and I observed a Golden Eagle (*Aquila chrysaetos*) nest on an unused center-pivot irrigation system in central Albany County, approximately 39 km north of Laramie, Wyoming. One adult was at the nest, which was occupied by one unfledged juvenile.

The nest, built primarily of sagebrush (*Artemisia* spp.), was placed 2.5 m above the ground on a crossarm of the irrigation system. The area surrounding the nest had been cultivated but was later overgrown with foxtail barley (*Hordeum* spp.), rabbitbrush (*Chrysothamnus* spp.), thistles (*Cirsium* spp.), and dandelions (*Taraxacum* spp.). Non-cultivated lands adjacent to the nest site are dominated by sagebrush. The site is level and treeless, at 2180 m elevation, and is 2 km from the nearest public road.

Golden Eagles traditionally nest in trees or on cliffs (Palmer 1988), but have been known to nest on man-made structures as well. Camenzind (1969) noted a nest on an abandoned gunnery tower at an army base, and Bohm (1988) mentioned Golden Eagles nesting on transmission line structures. Menkens (1982) noted several instances of Golden Eagles nesting on windmills. Also, in several cases Golden Eagles have used artificial nesting platforms provided for their use (Fala et al. 1985, Postovit et al. 1982).

I thank Ken Luepke, Phil Luepke, and Keith Merkel for their assistance. I also thank Mike Morrison of the Farmer's Home Administration for permitting access to the property and Clayton White and Richard Knight for reviewing an early draft of this note.

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Cover photo © by Terry A. Schulz of U.C. Davis Raptor Center: Flammulated Owl (*Otus flammeolus*), University of California Davis campus, Yolo County, California, 11 October 1984.

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WESTERN BIRDS

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THE BIRDS OF SOUTHEAST FARALLON ISLAND: OCCURRENCE AND SEASONAL DISTRIBUTION OF MIGRATORY SPECIES

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The small size and open terrain of Southeast Farallon Island, located 42 km west of San Francisco, provide ideal conditions for monitoring bird migration (DeSante and Ainley 1980, DeSante 1983). Recognizing this, ornithologists from the Point Reyes Bird Observatory (PRBO) have conducted standardized censuses of all migrant bird species daily since 3 April 1968. DeSante and Ainley (1980) summarized the occurrence patterns of the 331 species recorded on the island from 1854 to 2 April 1976 and noted an additional 15 species observed through 2 October 1979. Here we update DeSante and Ainley, noting a total of 375 species recorded on Southeast Farallon Island through 31 December 1989, and summarizing the occurrence patterns of 359 migratory species, 20 intraspecific forms, and four interspecific hybrids recorded from 3 April 1968 through 31 December 1989. For each migratory species we provide seasonal arrival data for both spring and fall, which should reflect movement patterns along the adjacent California coast. This "22-year" data set will provide the basis for future analyses on the climatic factors that influence migrants' arrival at the island and trends in the occurrence of species and biogeographical groups.

STUDY AREA AND CENSUSING METHODS

The location, topographical features, and vegetation structure of Southeast Farallon Island (Figure 1) and methods of censusing migratory birds there were described by DeSante and Ainley (1980) and DeSante (1983). Each day PRBO personnel censused all migrant individuals; for landbirds this was facilitated by most individuals' congregating at four or five vegetated or prominent areas on the island. An attempt was made either to band or, if possible, to determine the age and sex of landbirds in the field so

that turnover rates could be assessed. Shorebird roosts and freshwater seepages were censused daily at high tide in all months except from April through July, when coastal access was restricted to prevent disturbance to breeding seabirds. Visibility permitting, five-minute counts of migrating seabirds were conducted each morning, which were used to help determine daily arrivals. Roosting Brown Pelicans (*Pelecanus occidentalis*) were also counted each morning, visibility permitting.

The environmental conditions and censusing procedures varied little during the 22-year period of data collection. The two 8-m-high Monterey Cypresses (*Cupressus macrocarpa*) adjacent to the southeastern living quarters (see map in Coulter 1972), which had been one of the primary focal points of migratory lanbirds (DeSante and Ainley 1980), blew over in a storm on 13 November 1981. These were replaced by two saplings of the same species in 1982, at which time a third sapling cypress was planted adjacent to the northwestern living quarters. These three cypresses grew in height from about 3 to 5 m between their planting and December 1989. The bush mallow *Lavatera arborea*, a flowering biennial that grows to a height of 2.5 m, increased in abundance from a few plants in 1975 to three cultivated patches of approximately 100 m^2 each from 1980 through 1989. Two of these patches surrounded the Monterey Cypresses adjacent to each living quarters, and the third patch was located about 200 m southeast of the living quarters, in an area previously occupied only by annuals less than 0.5 m tall. The overall vegetation structure otherwise remained virtually unchanged from that described by DeSante and Ainley (1980). An increase in the annual totals of hummingbirds detected on the island since the late 1970s is probably related to the expansion of bush mallow, which has induced hummingbirds to stay longer (PRBO, unpublished data). Otherwise, because habitat considerations are inconsequential in determining the abundance of migrant landbirds on the island (DeSante and Ainley, 1980, p. 71), we assume that changes in the status of the Monterey Cypress and the bush mallow have altered neither the number of landbirds attracted to the island nor their detectability on daily censuses.

TERMINOLOGY AND METHODS OF ANALYSIS

Table 1 lists and summarizes the seasonal occurrence patterns of the 359 migratory species recorded on the island from 3 April 1968 through 31 December 1989. Five hypothetical species and three escaped cagebirds recorded during the 22-year period are listed separately, following the table. The notes, also following the table, describe anomalous occurrence patterns, unusual individual records, all breeding activity by landbirds, and other observations of interest.

Sixteen of the 375 species recorded on the island are not included in the table. Twelve of these are breeding seabirds, which were not censused daily: Leach's Storm-Petrel (*Oceanodroma leucorhoa*), Ashy Storm-Petrel (*O. homochroa*), Double-crested Cormorant (*Phalacrocorax auritus*), Brandt's Cormorant (*P. pencillatus*), Pelagic Cormorant (*P. pelagicus*), American Black Oystercatcher (*Haematopus bachmani*), Western Gull (*Larus occidentalis*), Common Murre (*Uria aalge*), Pigeon Guillemot (*Cepphus*

columba), Cassin's Auklet (*Ptychoramphus aleuticus*), Rhinoceros Auklet (*Cerorhinca monocerata*), and Tufted Puffin (*Fratercula cirrhata*). Ainley and Boekelheide (1990) and Carter et al. (1990) have provided detailed information on occurrence patterns and population status of these species on the island. The remaining four species, Short-tailed Albatross (*Diomedea albatrus*), White-faced Ibis (*Plegadis chihi*), Black Rail (*Laterallus jamaicensis*), and Clapper Rail (*Rallus longirostris*), were recorded on the island prior to 1968 but not during the period on which we report. DeSante and Ainley (1980) provided details on these species and others reported from the island prior to 1968. Table 1 includes the following categories:

Species. All migratory species identified with confidence on or within 2 km of the island during the 22-year census period are listed. For rare and vagrant species we follow the evaluations of the California Bird Records Committee (CBRC), which has reviewed or is in the process of reviewing records of all species included in Table 1 that meet their criteria for assessment (see Bevier 1990). Records of species not accepted by the CBRC are, at best, considered hypothetical by us. Also included in Table 1 are additional subentries for 17 subspecific taxa, three intergrades of subspecies, four interspecific hybrids, and two species pairs, grebes of the genus *Aechmophorus* and hummingbirds of the genus *Selasphorus*, in which a substantial portion of the individuals were identified to the pair but not to species.

Figure 1. Southeast Farallon Island.

Photo by Peter Pyle

Total. The total number of arrivals of each species recorded during the 22-year period is presented here. For landbirds, we used the same algorithim employed by DeSante and Ainley (1980, pp. 6–7) to calculate the minimal number of arrivals when similar unbanded individuals of a species occurred on successive days: arrivals = total minus total from the day before. By incorporating information on banded birds and distinctive plumage characteristics, well over 95% of arriving landbirds were recorded by means of this algorithim (DeSante and Ainley 1980).

Arrivals of waterbirds were carefully estimated with variations of the above algorithim, depending on our ability to census each species accurately. Our criteria for waterbirds are those employed by DeSante and Ainley (1980, p. 7) with the exception that, in our analysis, higher turnover during the late fall and winter was assumed for 11 species frequenting inaccessible portions of the island during this period and higher turnover throughout the year was assumed for Brown Pelicans. These assumptions were based on a reassessment of the data from the full 22-year period and on careful censuses we made of these species during the winters of 1988 through 1990. Totals for these species during the period covered by DeSante and Ainley were recalculated and differences can be found in the notes following the table. We have also reassessed in light of additional information the identification or arrival status of six individuals of five other species reported by DeSante and Ainley.

Not included in the totals are individuals not confidently identified to species or species-pair and rare or unseasonal species that were not adequately described by the observer. This latter group includes eight records of seven CBRC-review species that were either not accepted by the CBRC or have not yet been submitted to the committee owing to lack of a description. Dates of these records are listed in the notes following the table.

Spring, Fall, and Winter Totals. The total numbers of arrivals for each season are presented here. Seasonal definition follows DeSante and Ainley (1980) for the most part; for all species except shorebirds we define the three seasons of occurrence as follows: spring, 1 March–14 July; fall, 15 July–19 December; winter, 20 December–28 (or 29) February. For shorebirds (suborder Charadrii) we define spring as 1 March–20 June and fall as 21 June–19 December. The data presented in Table 1 rigorously follow these seasonal definitions, with the exception of 33 records of 16 species of landbirds that we reclassified after a careful examination of occurrence patterns (see DeSante and Ainley 1980, p. 6). The notes following the table specify these records and present additional data for 17 waterbird species whose arrival patterns appear to overlap two or more seasons significantly. We have included 18 known immature dispersants of four landbird species in the spring totals, along with other adults and birds of unknown age recorded in the same time period; records of these are also listed in the notes following the table. In addition, we have not distinguished fall visitants from winter residents that arrived in the fall, as did DeSante and Ainley, and our fall-to-winter cutoff date is 11 days earlier than that of DeSante and Ainley (as based on a reevaluation of landbird occurrence patterns over 22

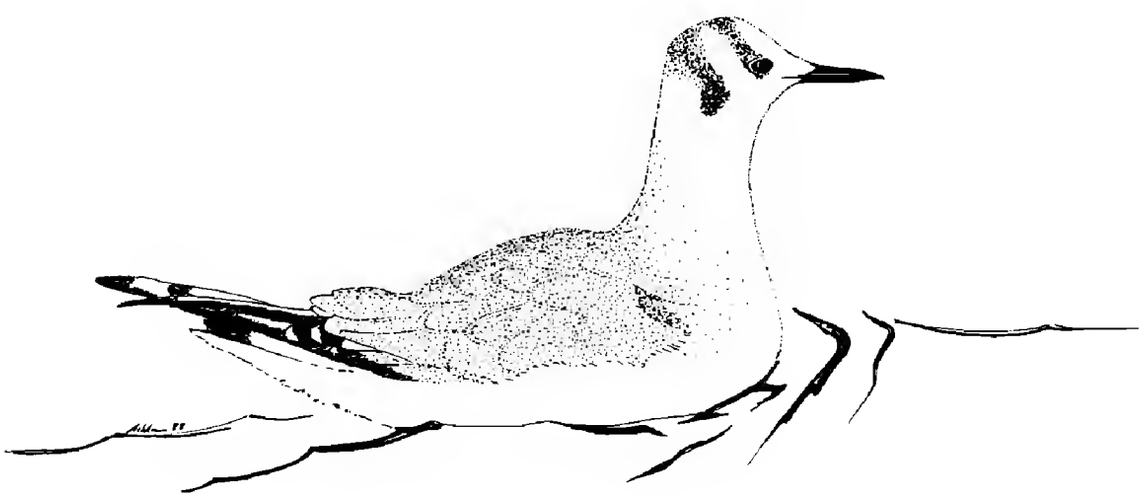
years). Those wishing to compare the results of the two analyses, therefore, should sum fall and winter arrival totals.

Date Ranges. Ranges of arrival dates within the spring and fall seasons, as defined above, are listed under this category. Anomalously late or early arrivals within seasons, along with the closest seasonal records during the 22-year period, are pointed out in notes following the table.

Mean Dates and Standard Deviations. The mean dates of arrival and the standard deviations (in days) around the means are presented for both spring and fall. The standard deviation indicates how extended or concentrated the peaks of occurrence are within each season; 68% of the arrivals fall within one standard deviation and 95% of the arrivals fall within two standard deviations of the mean. Generally, deviations of <10 days indicate a concentrated peak, those of 10–20 days indicate a moderately concentrated peak, and those of >20 days indicate extended arrival.

High Counts and Dates. The 22-year high count and date on which the high count was established are given for each species for both spring and fall. The high count refers to the total present on the island regardless of when the individuals arrived; note that in many cases this total includes birds that had arrived on previous dates and occasionally in previous seasons. If the high count was recorded on more than one date, the most recent chronological date is given. If the high count for the island fell during the winter it is listed in the notes following the table.

Winter Residents. We follow DeSante and Ainley (1980) in defining winter residents as individuals that remained on the island for ≥21 days, at least part of which was within the winter season. For each species the total number of residents occurring during the 21 winters of the data set is given.



Bonaparte's Gull *Sketch by Sven Achtermann*

Table 1 Occurrence and Seasonal Distribution of the Birds of Southeast Farallon Island

Species	Total	Spring				Fall				Winter	
		Seasonal Total	Date Range	Mean ±S.D.	High Count and Date	Seasonal Total	Date Range	Mean ±S.D.	High Count and Date	Total	Residents
Red-throated Loon	92	27	10 Mar–11 Jul	20 Apr ±36	4 30 Mar 69	54	1 Aug–19 Dec	2 Nov ±28	6 1 Nov 75	11	0
Gavia stellata											
Pacific Loon	31,576[a]	8046	1 Mar–14 Jul	25 Apr ±14	1853 24 Apr 81	23,248	17 Jul–18 Dec	11 Nov ± 9	4000 15 Nov 83	282	44
G. pacifica											
Common Loon	932	159	10 Mar–8 Jun	7 May ±19	100 8 May 84	760	18 Jul–19 Dec[b]	2 Nov ±16	200 5 Nov 84	13	2
G. immer											
Pied-billed Grebe	13	1	14 Jul	14 Jul —	1 14 Jul 86	12	26 Aug–28 Oct	27 Sep ±21	2 29 Aug 89[c]	0	0
Podilymbus podiceps											
Horned Grebe	62	10	1 Mar–24 Apr	17 Mar ±16	4 5 Mar 77[c]	34	16 Sep–16 Dec	1 Nov ±20	5 29 Oct 88	18	4
Podiceps auritus											
Red-necked Grebe	125[a]	30[d]	1 Mar–29 May	27 Mar ±24	3 10 Mar 85[c]	50[d]	12 Sep–19 Dec	24 Nov ±23	6 19 Dec 87	45[d]	12
P. grisegena											
Eared Grebe	10,435[a]	2060[d]	1 Mar–23 Jun	25 Mar ±18	1100 10 Apr 77	4320[d]	31 Aug–19 Dec	23 Nov ±21	350 19 Dec 76	4055[d]	6079
P. nigricollis											
Western Grebe	151	4	13 Apr–30 Jun	8 May ±37	2 17 Apr 89	137	28 Aug–8 Dec	17 Oct ±17	73 27 Oct 88	10	1
Aechmophorus occidentalis											
Clark's Grebe	15	8	28 Mar–27 Jun	7 Jun ±29	3 15 Jun 77	7	29 Jul–27 Nov	19 Oct ±40	1 2 Nov 89[c]	0	0
A. clarkii											
Total W./Clark's Grebe	519	60	1 Mar–10 Jul	5 May ±40	8 24 Mar 74	426	17 Jul–19 Dec	23 Oct ±24	74 27 Oct 88	33	12
A. occidentalis/clarkii											
Black-footed Albatross	142	119[d]	12 Mar–5 Jul	14 May ±23	10 18 May 77	20[d]	19 Jul–4 Dec	5 Sep ±49	3 21 Jul 80	3[d]	0
D. nigripes											
Laysan Albatross	2	1	21 Mar	21 Mar —	1 21 Mar 88	1	7 Dec	7 Dec —	1 7 Dec 83	0	0
D. immutabilis											

Northern Fulmar *Fulmarus glacialis*	3408	254[d]	1 Mar– 28 Jun	13 Mar ±20	40 17 Mar 82	1728[d]	28 Jul– 19 Dec	24 Nov ±23	310 1 Dec 77	1426[d]	0
Pink-footed Shearwater *Puffinus creatopus*	7301	867	24 Mar– 14 Jul	29 May ±24	40 30 May 89[c]	6434	19 Jul– 18 Dec	14 Sep ±21	800 15 Sep 77	0	0
Flesh-footed Shearwater *P. carneipes*	3	0	—	—	0	3	19 Sep– 19 Oct	9 Oct ±17	2 19 Oct 85	0	0
Buller's Shearwater *P. bulleri*	25,456	0	—	—	0	25,456	5 Aug– 1 Dec	6 Oct ±15	1570 3 Oct 86	0	0
Sooty Shearwater *P. griseus*	4,125,802	2,172,363[d]	1 Mar– 14 Jul	30 May ±21	400,000 18 Jun 74[c]	1,953,157[d]	15 Jul– 19 Dec	28 Aug ±17	220,000 28 Aug 84	282[d]	0
Short-tailed Shearwater *P. tenuirostris*	101	0	—	—	0	101	13 Oct– 6 Dec	17 Nov ±15	20 26 Nov 88	0	0
Black-vented Shearwater *P. opisthomelas*	241	0	—	—	0	241	22 Sep– 16 Nov	23 Oct ±10	24 30 Oct 84	0	0
Fork-tailed Storm-Petrel *Oceanodroma furcata*	1006[e]	1001	18 Mar– 5 May	18 Mar ± 2	1000 18 Mar 77	5	27 Jul– 28 Sep	25 Aug ±22	3 24 Aug 83	0	0
Black Storm-Petrel[e] *O. melania*	40	0	—	—	0	40	22 Aug– 7 Oct	25 Aug ± 7	27 24 Aug 83	0	0
Red-tailed Tropicbird[f] *Phaethon rubricauda*	1	1	3 Jul	3 Jul —	1 3 Jul 79	0	—	—	0	0	0
Brown Booby[f] *Sula leucogaster*	2	1	1 Jul	1 Jul —	1 1 Jul 84	1	24 Sep	24 Sep —	1 28 Sep 83[c]	0	0
Red-footed Booby[f] *S. sula*	2	0	—	—	0	2	26 Aug– 12 Oct	19 Sep ±33	1 12 Oct 75[c]	0	0
Brown Pelican *Pelecanus occidentalis*	268,069[a]	17,340[d]	1 Mar– 14 Jul	13 Jun ±25	1430 8 Jun 80	246,992[d]	15 Jul– 19 Dec	25 Sep ±32	5670 9 Sep 84	3737[d]	0
Magnificent Frigatebird[e] *Fregata magnificens*	4	1	2 Jul	2 Jul —	1 2 Jul 87	3	16 Jul– 16 Dec	6 Sep ±87	1 16 Dec 88[c]	0	0
American Bittern *Botaurus lentiginosus*	4	0	—	—	0	4	5 Oct– 26 Oct	16 Oct ± 9	1 20 Oct 87[c]	0	0

(Continued)

Table 1 (*Cont.*)

Species	Total	Spring				Fall				Winter	
		Seasonal Total	Date Range	Mean ±S.D.	High Count and Date	Seasonal Total	Date Range	Mean ±S.D.	High Count and Date	Total	Residents
Great Blue Heron *Ardea herodias*	130	11[d]	8 Mar–6 Jul	8 Jun ±45	2 6 Jul 88[c]	117[d]	16 Jul–6 Dec	5 Sep ±25	3 8 Sep 89[c]	2[d]	3[e]
Great Egret *Casmerodius albus*	34	2	13 Jun–14 Jun	14 Jun ± 1	1 13 Jun 75[c]	31	24 Jul–19 Nov	20 Sep ±34	3 10 Aug 87	1	0
Snowy Egret *Egretta thula*	36	7	27 Apr–13 Jul	16 Jun ±31	1 11 May 89[c]	29	18 Jul–19 Dec	18 Sep ±40	7 8 Oct 88	0	0
Cattle Egret *Bubulcus ibis*	78	0	—	—	0	73	16 Sep–19 Dec	22 Nov ±17	21 23 Nov 84	5	5
Green-backed Heron *Butorides striatus*	13	5	29 Apr–13 Jul	16 Jun ±30	1 14 Jun 87[c]	8	1 Aug–14 Oct	10 Sep ±23	1 14 Oct 88[c]	0	0
Black-crowned Night-Heron *Nycticorax nycticorax*	7	0	—	—	0	6	18 Aug–12 Nov	19 Sep ±35	1 12 Sep 88[c]	1	0
Tundra Swan *Cygnus columbianus*	10	0	—	—	0	10	11 Nov	11 Nov ± 0	10 11 Nov 78	0	0
Greater White-fronted Goose *Anser albifrons*	7	3	10 Mar–3 May	28 Mar ±31	2 10 Mar 80	4	25 Sep–12 Oct	3 Oct ± 8	1 25 Sep 86[c]	0	0
Snow Goose *Chen caerulescens*	2	0	—	—	0	2	15 Oct–1 Dec	8 Nov ±33	1 16 Oct 89[c]	0	1
Ross' Goose *C. rossii*	1	0	—	—	0	1	11 Dec	11 Dec —	1 11 Dec 86	0	0
Brant *Branta bernicla*	10,473	1333	18 Mar–22 May	11 Apr ±23	440 22 Mar 79	9139	25 Oct–18 Dec	6 Nov ± 5	7200 4 Nov 83	1	0
Canada Goose *B. canadensis*	555	2	15 Mar–30 Apr	7 Apr ±33	1 30 Apr 80[c]	547	7 Oct–18 Dec	7 Nov ±10	401 4 Nov 78	6	2

Green-winged Teal *Anas crecca*	180	0	—	—	0	179	14 Aug– 17 Dec	6 Oct ±24	39 13 Oct 87	1	0
Mallard *Anas platyrhynchos*	55	6	31 Mar– 26 Apr	10 Apr ±10	2 10 Apr 88[c]	49	13 Aug– 22 Nov	24 Oct ±28	9 15 Nov 78	0	0
Northern Pintail *A. acuta*	2575	5	12 Mar– 20 Mar	15 Mar ± 3	3 15 Mar 77	2567	27 Jul– 8 Dec	21 Sep ±25	175 19 Oct 78	3	0
Blue-winged Teal *A. discors*	4	0	—	—	0	4	22 Sep– 13 Oct	28 Sep ±10	2 22 Sep 78	0	0
Cinnamon Teal *A. cyanoptera*	74	10[d]	1 Mar– 2 Mar	2 Mar ± 0	7 2 Mar 79	55	7 Sep– 23 Oct	26 Sep ±11	11 24 Sep 83	9[d]	0
Northern Shoveler *A. clypeata*	30	1	27 Jun	27 Jun —	1 27 Jun 89	29	14 Aug– 2 Nov	6 Oct ±26	10 2 Nov 86	0	0
Gadwall *A. strepera*	4	0	—	—	0	4	14 Aug– 18 Dec	20 Sep ±60	1 14 Aug 88[c]	0	0
American Wigeon *A. americana*	40	0	—	—	0	40	11 Sep– 31 Oct	8 Oct ±11	9 14 Oct 87	0	0
Canvasback *Aythya valisineria*	2	0	—	—	0	2	24 Oct– 28 Nov	11 Nov ±25	1 24 Oct 88[c]	0	0
Ring-necked Duck *A. collaris*	1	0	—	—	0	1	7 Oct	7 Oct —	1 8 Oct 87[c]	0	0
Greater Scaup *A. marila*	59	0	—	—	0	58	4 Oct– 11 Dec	24 Oct ±11	18 27 Oct 88	1	0
Lesser Scaup *A. affinis*	13	0	—	—	0	13	29 Sep– 8 Nov	25 Oct ±14	6 30 Oct 89	0	0
Harlequin Duck *Histrionicus histrionicus*	23	3	25 Mar– 20 May	22 Apr ±28	2 24 Apr 81[c]	11	23 Jul– 19 Dec	6 Oct ±52	2 2 Dec 78	9	5
Oldsquaw *Clangula hyemalis*	26	5[d]	2 Mar– 10 Mar	8 Mar ± 3	2 8 Mar 81	12[d]	16 Oct– 11 Dec	19 Nov ±18	3 20 Nov 80[c]	9[d]	0
Black Scoter *Melanitta nigra*	22	0	—	—	0	12	9 Oct– 9 Dec	3 Nov ±27	5 9 Oct 85	10	0

(Continued)

Table 1 (*Cont.*)

Species	Total	Spring				Fall				Winter	
		Seasonal Total	Date Range	Mean ±S.D.	High Count and Date	Seasonal Total	Date Range	Mean ±S.D.	High Count and Date	Total	Residents
Surf Scoter *M. perspicillata*	4314[a]	1761[d]	2 Mar–18 Jun	5 Apr ±22	200 21 Apr 82[c]	1885[d]	16 Jul–19 Dec[b]	13 Nov ±19	233 13 Nov 89	668[d]	427
White-winged Scoter *M. fusca*	446	184[d]	1 Mar–6 Jul	6 Apr ±20	33 9 Apr 85	182[d]	14 Sep–19 Dec	6 Nov ±19	35 30 Oct 71	80[d]	23
Common Goldeneye[e] *Bucephala clangula*	19	5	12 Apr–6 Jun	7 May ±22	2 15 May 70	2	7 Dec–17 Dec	12 Dec ± 7	2 17 Dec 78	12	2
Barrow's Goldeneye[e] *B. islandica*	1	0	—	—	0	0	—	—	0	1	0
Bufflehead *B. albeola*	8	6	2 Apr–7 Apr	6 Apr ± 2	5 7 Apr 82	2	13 Nov–17 Dec	30 Nov ±24	1 13 Nov 89[c]	0	0
Red-breasted Merganser *Mergus serrator*	300[a]	44[d]	4 Mar–17 May	31 Mar ±20	6 18 Mar 86[c]	144[d]	16 Oct–19 Dec	26 Nov ±13	10 23 Nov 73	112[d]	90
Ruddy Duck *Oxyura jamaicensis*	27	0	—	—	0	25	27 Sep–7 Dec	24 Oct ±18	15 25 Oct 70	2	0
Turkey Vulture *Cathartes aura*	2	2	22 May	22 May ± 0	2 22 May 79	0	—	—	0	0	0
Osprey *Pandion haliaetus*	31	5	29 Mar–31 May	11 May ±25	1 22 May 88[c]	26	23 Jul–20 Nov	21 Sep ±23	2 24 Sep 89	0	0
Black-shouldered Kite *Elanus caeruleus*	10	0	—	—	0	10	11 Sep–5 Nov	6 Oct ±18	2 11 Sep 84[c]	0	0
Bald Eagle *Haliaeetus leucocephalus*	6	0	—	—	0	4	1 Oct–22 Nov	4 Nov ±24	1 19 Nov 85[c]	2	0
Northern Harrier *Circus cyaneus*	102	1	6 Apr	6 Apr —	1 6 Apr 82	101	27 Jul–13 Dec	15 Oct ±29	4 8 Oct 88	0	0
Sharp-shinned Hawk *Accipiter striatus*	208	0	—	—	0	208	11 Sep–24 Nov	4 Oct ±16	13 18 Sep 88	0	0

Cooper's Hawk *A. cooperii*	26	0	—	—	0	26	12 Sep– 19 Oct	1 Oct ± 7	3 29 Sep 74	0	0
Red-tailed Hawk *Buteo jamaicensis*	10	3	6 Apr– 22 May	24 Apr ±24	1 6 Apr 83[c]	5	26 Oct– 12 Dec	10 Nov ±19	1 12 Dec 82[c]	2	3
Rough-legged Hawk *B. lagopus*	47	0	—	—	0	45	28 Sep– 11 Dec	10 Nov ±17	12 27 Oct 73	2	4
Golden Eagle *Aquila chrysaetos*	1	0	—	—	0	1	28 Oct	28 Oct —	1 28 Oct 71	0	0
American Kestrel *Falco sparverius*	321	3	14 Jun– 26 Jun	20 Jun ± 6	2 14 Mar 89[c]	311	24 Jul– 15 Dec	6 Oct ±27	5 30 Nov 78	7	26
Merlin *F. columbarius*	95	0	—	—	0	95	7 Sep– 15 Nov	8 Oct ±15	3 25 Oct 88[c]	0	0
Peregrine Falcon *F. peregrinus*	294[a,e]	44	1 Mar– 29 Jun	19 Apr ±20	4 22 Mar 89[c]	228	26 Jul– 16 Dec	15 Oct ±24	5 30 Oct 88[c]	22	70
Prairie Falcon *F. mexicanus*	1	0	—	—	0	1	23 Sep	23 Sep	1 23 Sep 80	0	0
Virginia Rail *R. limicola*	6	0	—	—	0	6	11 Aug– 21 Sep	31 Aug ±14	2 26 Aug 87	0	0
Sora *Porzana carolina*	16	2	26 May– 30 Jun	13 Jun ±25	1 30 Jun 81[c]	14	21 Jul– 15 Oct	10 Sep ±25	2 15 Oct 82	0	0
Common Moorhen *Gallinula chloropus*	2	2	13 May– 6 Jun	25 May ±17	1 22 May 89[c]	0	—	—	0	0	0
American Coot *Fulica americana*	15	2	11 May– 12 May	12 May ± 1	1 12 May 81[c]	13	12 Sep– 27 Oct	4 Oct ±12	2 7 Oct 80	0	0
Black-bellied Plover *Pluvialis squatarola*	896	54	1 Mar– 11 May	29 Mar ±17	11 14 Mar 80[c]	815	17 Jul– 15 Dec	28 Sep ±34	42 26 Oct 81	27	253
Lesser Golden-Plover *P. dominica*	130	3	28 Apr– 28 May	8 May ±17	1 28 May 80[c]	126	22 Aug– 9 Dec	10 Oct ±24	14 17 Oct 89	1	1
American Golden-Plover *P. d. dominica*	19	0	—	—	0	19	25 Aug– 19 Oct	13 Sep ±16	3 18 Sep 89[c]	0	0

(Continued)

Table 1 (*Cont.*)

Species	Total	Spring				Fall				Winter	
		Seasonal Total	Date Range	Mean ±S.D.	High Count and Date	Seasonal Total	Date Range	Mean ±S.D.	High Count and Date	Total	Residents
Pacific Golden-Plover *P. d. fulva*	52	0	—	—	0	52	14 Sep–9 Dec	24 Oct ±18	14 17 Oct 89	0	1
Snowy Plover *Charadrius alexandrinus*	3	0	—	—	0	3	27 Aug–5 Oct	15 Sep ±20	1 15 Sep 89[c]	0	0
Semipalmated Plover *C. semipalmatus*	180[e]	0	—	—	0	180	27 Jul–6 Oct	30 Aug ±13	29 27 Aug 88	0	0
Killdeer[e] *C. vociferus*	443	18	16 Mar–16 Jun	14 May ±26	2 4 May 80[c]	365	12 Jul–19 Dec	17 Oct ±30	27 26 Oct 88	60	21
Eurasian Dotterel[f] *C. morinellus*	2	0	—	—	0	2	12 Sep–15 Sep	14 Sep ± 2	1 15 Sep 89[c]	0	0
American Avocet *Recurvirostra americana*	3	0	—	—	0	2	28 Jul–31 Aug	14 Aug ±24	1 11 Aug 73[c]	1	0
Greater Yellowlegs *Tringa melanoleuca*	46	1	29 Apr	29 Apr —	1 29 Apr 68	45	27 Jul–2 Dec	23 Sep ±24	2 11 Oct 89[c]	0	0
Lesser Yellowlegs *T. flavipes*	47	1	3 May	3 May —	1 3 May 71	46	10 Jul–27 Sep	19 Aug ±18	6 16 Aug 87	0	0
Solitary Sandpiper *T. solitaria*	1	0	—	—	0	1	7 Sep	7 Sep —	1 7 Sep 89	0	0
Willet *Catoptrophorus semipalmatus*	753	30	5 Apr–20 Jun	11 May ±24	22 11 Mar 82	717	21 Jun–15 Dec	6 Sep ±38	26 16 Dec 87	6 [c]	379
Wandering Tattler *Heteroscelus incanus*	1276[a]	262	7 Mar–16 Jun	4 May ±18	21 19 May 76[c]	999	23 Jun–10 Dec	5 Sep ±35	56 17 Aug 89	15	292
Spotted Sandpiper *Actitis macularia*	114	10	20 Apr–24 May	11 May ±11	1 22 May 83[c]	104	23 Jul–15 Nov	8 Sep ±21	4 4 Sep 89[c]	0	0
Upland Sandpiper[f] *Bartramia longicauda*	2[g]	0[g]	—	—	0	2	22 Aug–27 Aug	25 Aug ± 4	1 27 Aug 89[c]	0	0

Whimbrel *Numenius phaeopus*	850	162	7 Mar– 19 Jun	10 May ±17	49 10 May 79	682	25 Jun– 13 Dec	2 Sep ±31	131 27 Aug 83	6	161
Long-billed Curlew *N. americanus*	4[g]	0	—	—	0	4[g]	28 Jun– 30 Aug	27 Jul ±26	1 28 Jun 77[c]	0	0
Marbled Godwit *Limosa fedoa*	394	5	16 Mar– 31 May	30 Apr ±29	2 27 Apr 71	389	28 Jun– 27 Nov	2 Sep ±22	27 14 Aug 75	0	0
Ruddy Turnstone *Arenaria interpres*	395[a]	47	17 Mar– 5 Jun	4 May ±19	12 6 Mar 87	333	2 Jul– 19 Dec	14 Sep ±36	25 16 Dec 87	15	84
Black Turnstone *A. melanocephala*	2848[a]	121	1 Mar– 10 Jun	19 Apr ±30	71 5 Mar 85	2474	26 Jun– 15 Dec	20 Sep ±35	106 25 Sep 75	253	1282
Surfbird *Aphriza virgata*	197	15	3 Mar– 29 Apr	18 Apr ±10	5 19 Apr 83	170	6 Aug– 19 Dec	6 Sep ±33	19 8 Aug 68	12	18
Red Knot *Calidris canutus*	5	0	—	—	0	5	9 Sep– 3 Oct	19 Sep ±10	1 18 Sep 88[c]	0	0
Sanderling *C. alba*	162	0	—	—	0	160	6 Jul– 14 Dec	12 Sep ±33	14 17 Sep 75	2	0
Semipalmated Sandpiper *C. pusilla*	9	0	—	—	0	9	3 Aug– 5 Sep	17 Aug ±11	2 20 Aug 77	0	0
Western Sandpiper *C. mauri*	668	0	—	—	0	662	5 Jul– 24 Oct	31 Aug ±18	96 17 Aug 89	6	0
Least Sandpiper *C. minutilla*	348	3	6 Mar– 10 May	30 Mar ±35	1 6 Mar 89[c]	344	10 Jul– 16 Nov	31 Aug ±20	18 11 Aug 88	1	6
Baird's Sandpiper *C. bairdii*	244	1	11 May	11 May —	1 11 May 69	243	10 Jul– 11 Oct	26 Aug ±14	16 16 Aug 87	0	0
Pectoral Sandpiper *C. melanotos*	219	1	4 May	4 May —	1 4 May 68	218	11 Aug– 23 Oct	20 Sep ±14	16 27 Sep 76[c]	0	0
Sharp-tailed Sandpiper *C. acuminata*	4	0	—	—	0	4	2 Sep– 7 Nov	25 Sep ±30	1 3 Sep 89[c]	0	0
Rock Sandpiper *C. ptilocnemis*	18	0	—	—	2 3 Apr 80[c]	16	19 Oct– 5 Dec	10 Nov ±14	2 18 Dec 79[c]	2	12

(Continued)

Table 1 (*Cont.*)

Species	Total	Spring				Fall				Winter	
		Seasonal Total	Date Range	Mean ±S.D.	High Count and Date	Seasonal Total	Date Range	Mean ±S.D.	High Count and Date	Total	Residents
Dunlin	152[g]	1	20 May	20 May	1	150[g]	14 Sep–	14 Oct	70	1	2
C. alpina				—	20 May 71		9 Dec	± 9	14 Oct 87		
Buff-breasted Sandpiper[f]	5	0	—	—	0	5	29 Aug–	2 Sep	2	0	0
Tryngites subruficollis							8 Sep	± 5	29 Aug 78		
Short-billed Dowitcher	756	1	14 Apr	14 Apr	1	755	2 Jul–	26 Aug	150	0	0
Limnodromus griseus				—	14 Apr 89		19 Oct	±18	4 Sep 85		
Long-billed Dowitcher	270	0	—	—	0	269	18 Jul–	29 Sep	41	1	1
L. scolopaceus							10 Dec	±25	22 Sep 86		
Common Snipe	106	6	3 Apr–	6 May	1	99	18 Jul–	10 Oct	4	1	0
Gallinago gallinago			28 May	±19	9 May 89[c]		12 Dec	±28	27 Oct 88		
Wilson's Phalarope	3	0	—	—	0	3	20 Jul–	1 Aug	1	0	0
Phalaropus tricolor							17 Aug	±14	17 Aug 88[c]		
Red-necked Phalarope	107,728	24,977	12 Apr–	5 May	4100	82,751	23 Jul–	3 Sep	19,500	0	0
P. lobatus			29 May	±10	30 Apr 82		28 Nov	±22	22 Aug 68		
Red Phalarope	147,282	8714	15 Apr–	13 May	2000	138,251	14 Jul–	22 Sep	20,000	317	0
P. fulicaria			3 Jun	± 9	3 May 82		19 Dec	±37	22 Aug 71		
Pomarine Jaeger	206	2	23 Apr–	24 Apr	1	202	10 Aug–	5 Oct	11	2	0
Stercorarius pomarinus			24 Apr	± 1	24 Apr 89[c]		18 Nov	±18	15 Sep 87		
Parasitic Jaeger	70	0	—	—	0	69	20 Aug–	9 Oct	5	1	0
S. parasiticus							21 Nov	±22	14 Nov 80		
Long-tailed Jaeger	1	1	29 Apr	29 Apr	1	0	—	—	0	0	0
S. longicaudus					29 Apr 71						
South Polar Skua	11	0	—	—	0	11	20 Sep–	7 Oct	1	0	0
Catharacta maccormicki							29 Oct	±14	20 Oct 89[c]		
Laughing Gull	2	1	2 Jun	2 Jun	1	1	3 Aug	3 Aug	1	0	0
Larus atricilla				—	3 Jun 88[c]			—	3 Aug 77		

Franklin's Gull	1	0	—	—	0	1	4 Sep	4 Sep	1	0	0
L. pipixcan								—	4 Sep 83		
Bonaparte's Gull	38,873	37,220	1 Mar–	24 Apr	30,000	1627	28 Sep–	7 Nov	340	26	0
L. philadelphia			28 May	± 6	26 Apr 70		19 Dec	± 8	10 Nov 87		
Heermann's Gull	8473	120	5 Mar–	1 Jun	16	8163	15 Jul–	23 Sep	820	190	42
L. heermanni			14 Jul	±48	5 Mar 80		19 Dec	±34	9 Aug 83		
Mew Gull	569	38	3 Mar–	18 Mar	3	406	12 Sep–	7 Nov	50	125	18
L. canus			9 May	±14	24 Mar 85[c]		19 Dec	±19	14 Oct 70		
Ring-billed Gull	98	7	3 Mar–	28 Apr	1	85	30 Jul–	19 Oct	6	6	0
L. delawarensis			14 Jul	±60	3 Jun 88[c]		15 Dec	±33	5 Oct 68[c]		
California Gull	22,848	413	1 Mar–	10 Apr	20	21,789	16 Jul–	27 Oct	1370	646	2
L. californicus			14 Jul	±33	5 Mar 78		19 Dec	±26	15 Oct 83		
Herring Gull[e]	5804[a]	1604[d]	2 Mar–	22 Mar	125	1260[d]	19 Aug–	20 Nov	59	2940[d]	510
L. argentatus			12 Jul[b]	±15	4 Mar 77		19 Dec	±23	11 Dec 76		
Thayer's Gull[e]	248	51[d]	1 Mar–	24 Mar	5	89[d]	7 Oct–	17 Nov	8	108[d]	2
L. thayeri			30 May[b]	±18	27 Mar 88[c]		19 Dec	±22	31 Oct 85		
Glaucous-winged Gull	9563[a]	1744[d]	3 Mar–	20 Mar	332	2602[d]	13 Aug–	4 Dec	440	5217[d]	1704
L. glaucescens			20 Jun	±15	21 Mar 82		19 Dec[b]	±18	18 Dec 79		
Glaucous Gull[e]	30	8[d]	4 Mar–	31 Mar	1	5[d]	24 Oct–	15 Nov	1	17[d]	3
L. hyperboreus			16 May	±21	27 Mar 87[c]		9 Dec	±18	18 Nov 89[c]		
Black-legged Kittiwake	22,411	18,827	1 Mar–	16 Mar	4000	1089	16 Aug–	11 Nov	450	2495	0
Rissa tridactyla			27 May	±11	4 Mar 76		19 Dec	±11	19 Nov 70		
Sabine's Gull	84	16	26 Mar–	14 May	10	68	20 Aug–	23 Sep	25	0	0
Xema sabini			16 Jun[b]	±18	18 May 77		11 Nov	±16	17 Sep 83		
Caspian Tern	29	7	26 May–	14 Jun	2	22	15 Jul–	26 Aug	3	0	0
Sterna caspia			9 Jul	±17	13 Jun 89[c]		10 Oct	±27	17 Jul 83[c]		
Elegant Tern	421	0	—	—	0	421	2 Aug–	13 Sep	120	0	0
S. elegans							14 Nov	±15	15 Sep 84		
Common Tern	6	0	—	—	0	6	31 Aug–	8 Sep	3	0	0
S. hirundo							14 Sep	± 5	9 Sep 69[c]		

(Continued)

Figure 2. American Kestrel, Southeast Farallon Island, November 1985.

Photo by Peter Pyle

Figure 3. Lesser Golden Plover (*Pluvialis d. dominica*), Southeast Farallon Island, 27 September 1990.

Photo by Peter Pyle

Figure 4. Laughing Gull, Southeast Farallon Island, 2 June 1988.

Photo by Peter Pyle

Figure 5. Black-throated Gray Warbler, Southeast Farallon Island, 20 September 1984.

Photo by Peter Pyle

Table 1 (*Cont.*)

Species	Total	Spring				Fall				Winter	
		Seasonal Total	Date Range	Mean ±S.D.	High Count and Date	Seasonal Total	Date Range	Mean ±S.D.	High Count and Date	Total	Residents
Arctic Tern	2905	0	—	—	0	2905	31 Aug–9 Oct	17 Sep ± 7	600 15 Sep 82	0	0
S. paradisaea											
Forster's Tern	1	0	—	—	0	1	28 Oct	28 Oct —	1 28 Oct 86	0	0
S. forsteri											
Thick-billed Murre[f]	1	0	—	—	0	1	29 Oct	29 Oct —	1 29 Oct 88	0	0
U. lomvia											
Marbled Murrelet	1	0	—	—	0	1	11 Oct	11 Oct —	1 11 Oct 89	0	0
Brachyramphus marmoratus											
Xantus' Murrelet	8[e]	1	26 Mar	26 Mar —	1 26 Mar 80	6	17 Jul–19 Oct	14 Aug ±33	2 4 Aug 89	1	0
Synthliboramphus hypoleucus											
Craveri's Murrelet	1	0	—	—	0	1	15 Nov	15 Nov —	1 15 Nov 83	0	0
S. craveri											
Ancient Murrelet	324	19[d]	2 Mar–10 Jun	31 Mar ±35	2 10 Jun 83[c]	137[d]	23 Jul–19 Dec	24 Nov ±24	30 11 Dec 75	168[d]	13
S. antiquus											
Horned Puffin	12	4	2 Jun–17 Jun	11 Jun ± 8	1 6 Jun 89[c]	7	26 Sep–22 Nov	19 Oct ±19	2 25 Oct 75	1	0
F. corniculata											
Rock Dove	144	70	2 Mar–14 Jul	4 May ±29	3 15 May 77[c]	67	15 Jul–16 Dec	27 Sep ±31	12 14 Sep 75	7	0
Columba livia											
Band-tailed Pigeon	341	151	24 Mar–14 Jul	27 May ±29	6 7 Jul 70[c]	189	15 Jul–11 Dec	14 Sep ±37	4 21 Oct 72	1	0
C. fasciata											
White-winged Dove	12	0	—	—	0	12	26 Aug–24 Nov	30 Sep ±26	1 14 Sep 89[c]	0	0
Zenaida asiatica											
Mourning Dove	746	172	29 Mar–13 Jul	17 May ±20	14 29 Apr 68	572	17 Jul–8 Dec	16 Sep ±24	20 3 Sep 72	2	0
Z. macroura											
Black-billed Cuckoo[f]	2	0	—	—	0	2	26 Aug–18 Oct	22 Sep ±38	1 26 Aug 87[c]	0	0
Coccyzus erythropthalmus											

Yellow-billed Cuckoo *C. americanus*	15	7	14 Jun– 4 Jul	23 Jun ± 9	1 1 Jul 89[c]	8	21 Jul– 7 Nov	3 Sep ±36	1 21 Jul 88[c]	0	0
Common Barn-Owl *Tyto alba*	6	1	13 Jul	13 Jul —	1 13 Jul 73	5	31 Aug– 19 Oct	25 Sep ±20	1 5 Nov 87[c]	0	0
Great Horned Owl[e] *Bubo virginianus*	1	0	—	—	0	1	21 Nov	21 Nov —	1 21 Nov 70	0	0
Burrowing Owl *Athene cunicularia*	216[g]	28	2 Mar– 20 May	4 Apr ±20	5 1 Mar 80	183[g]	8 Sep– 5 Dec	9 Oct ±20	10 12 Oct 89[c]	5	40
Long-eared Owl *Asio otus*	40	4	21 May– 14 Jul	22 Jun ±24	1 17 Jun 88[c]	36	17 Jul– 26 Nov	15 Sep ±36	3 5 Aug 74[c]	0	0
Short-eared Owl *A. flammeus*	198	4	16 Apr– 5 Jul	3 Jun ±35	1 16 Apr 88[c]	187	16 Jul– 7 Dec	14 Oct ±18	17 27 Oct 88	7	4
Northern Saw-whet Owl *Aegolius acadicus*	15	0	—	—	0	14	20 Sep– 18 Nov	25 Oct ±16	2 19 Nov 87[c]	1	0
Lesser Nighthawk *Chordeiles acutipennis*	44	38	18 May– 14 Jul	15 Jun ±16	2 30 Jun 80[c]	6	21 Jul– 9 Sep	17 Aug ±18	1 10 Aug 89[c]	0	0
Common Nighthawk *C. minor*	3	1	16 Jun	16 Jun —	1 16 Jun 77	2	8 Sep	8 Sep ± 0	1 8 Sep 87[c]	0	0
Common Poorwill *Phalaenoptilus nuttallii*	7	0	—	—	0	7	9 Sep– 31 Oct	9 Oct ±18	1 12 Oct 89[c]	0	0
Black Swift *Cypseloides niger*	15	5	9 Jun– 11 Jun	10 Jun ± 1	3 11 Jun 75	10	1 Aug– 9 Oct	4 Sep ±22	2 9 Aug 89[c]	0	0
Chimney Swift *Chaetura pelagica*	17	10	26 May– 15 Jun	7 Jun ± 6	4 11 Jun 75	7	11 Sep– 2 Oct	25 Sep ± 7	2 27 Sep 85	0	0
Vaux's Swift *C. vauxi*	813	10	4 May– 31 May	18 May ± 8	3 22 May 83[c]	803	4 Sep– 27 Oct	29 Sep ± 8	102 23 Sep 85	0	0
White-throated Swift *Aeronautes saxatalis*	7	4	6 Apr– 27 Apr	16 Apr ±12	2 6 Apr 83[c]	3	17 Oct– 25 Oct	20 Oct ± 5	2 17 Oct 69	0	0
Ruby-throated Hummingbird[f] *Archilochus colubris*	1[g]	0	—	—	0	1[g]	21 Aug	21 Aug —	1 21 Aug 85	0	0

(Continued)

Table 1 (*Cont.*)

Species	Total	Spring				Fall				Winter	
		Seasonal Total	Date Range	Mean ±S.D.	High Count and Date	Seasonal Total	Date Range	Mean ±S.D.	High Count and Date	Total	Residents
Black-chinned Hummingbird *A. alexandri*	3	0	—	—	0	3	28 Aug–15 Sep	5 Sep ± 9	1 28 Aug 87[c]	0	0
Anna's Hummingbird *Calypte anna*	255	36	17 Mar–14 Jun	1 May ±27	2 24 Mar 74[c]	214	21 Jul–10 Dec	9 Oct ±23	7 9 Oct 89	5	0
Costa's Hummingbird *C. costae*	16	13	17 Apr–13 Jul	15 May ±25	2 28 May 85	3	14 Aug–11 Oct	21 Sep ±33	1 9 Oct 87[c]	0	0
Calliope Hummingbird *Stellula calliope*	9	8	5 Apr–8 May	23 Apr ±14	1 13 Apr 88[c]	1	5 Oct	5 Oct —	1 9 Oct 86[c]	0	0
Rufous Hummingbird *Selasphorus rufus*	398	241[b]	15 Feb–4 Jun	13 Apr ±14	50 13 Apr 78[c]	156	19 Jul–10 Oct	24 Aug ±16	10 26 Aug 87	0[b]	0
Allen's Hummingbird *S. sasin*	68	57[b]	5 Feb–7 Jul	3 May ±38	3 10 Mar 79	11	29 Jul–12 Sep	9 Aug ±13	3 3 Aug 78	0[b]	0
Total Rufous/Allen's Hummingbird *S. rufus/sasin*	549	325[b]	3 Feb–13 Jul	18 Apr ±24	51 13 Apr 78[c]	224	19 Jul–10 Oct	22 Aug ±15	10 26 Aug 87	0[b]	0
Belted Kingfisher *Ceryle alcyon*	122	21	2 Mar–11 Jul	4 May ±36	2 14 Apr 77	97	17 Jul–1 Dec	9 Sep ±30	4 15 Sep 74	4	21
Lewis' Woodpecker *Melanerpes lewis*	7[g]	4[g]	29 Apr–8 May	3 May ± 5	2 8 May 77[c]	3	20 Sep–27 Sep	24 Sep ± 4	1 20 Sep 83[c]	0	0
Acorn Woodpecker *M. formicivorus*	9	0	—	—	0	8	11 Sep–25 Nov	6 Oct ±28	2 12 Sep 89[c]	1	0
Red-naped Sapsucker *Sphyrapicus nuchalis*	4	1	18 Jun	18 Jun —	1 20 Jun 74[c]	3	28 Sep–13 Oct	4 Oct ± 8	1 28 Sep 83[c]	0	0
Red-breasted Sapsucker *S. ruber*	21	2	25 Mar–19 Apr	7 Apr ±18	1 19 Apr 81[c]	19	27 Sep–2 Nov	8 Oct ± 9	4 2 Oct 68[c]	0	0
Northern Flicker *Colaptes auratus*	489	77	1 Mar–6 Jun	6 Apr ±17	8 4 Apr 73	401	17 Sep–18 Dec	18 Oct ±18	18 3 Oct 86	11	31

Yellow-shafted Flicker *C. auratus luteus*	60	57	23 Mar– 22 May	13 Apr ±20	3 5 Apr 84	52	28 Sep– 27 Nov	16 Oct ±15	5 8 Oct 72	1	1
Yellow- × Red-shafted Flicker	45	5	26 Mar– 23 Apr	7 Apr ±12	2 26 Mar 82	40	26 Sep– 5 Dec	18 Oct ±15	3 8 Oct 86[c]	0	2
Red-shafted Flicker *C. a. cafer* subspecies group	319	7	8 Mar– 6 Jun	7 Apr ±17	7 4 Apr 73	254	17 Sep– 18 Dec	18 Oct ±19	14 5 Oct 72	8	28
Olive-sided Flycatcher *Contopus borealis*	169	100	22 Apr– 27 Jun	22 May ±13	10 27 May 70[c]	69	16 Jul– 27 Oct	6 Sep ±17	8 6 Sep 85	0	0
Western Wood-Pewee *C. sordidulus*	1463	1044	20 Apr– 12 Jul	29 May ±12	80 28 May 83	419	15 Jul– 19 Nov	10 Sep ±14	60 6 Sep 85	0	0
Eastern Wood-Pewee[f] *C. virens*	1	1	15 Jun	15 Jun	1 15 Jun 75	0	—	—	0	0	0
Yellow-bellied Flycatcher[f] *Empidonax flaviventris*	4	0	—	—	0	4	3 Sep– 27 Sep	14 Sep ±10	1 9 Sep 89[c]	0	0
Willow Flycatcher *E. traillii*	308[e]	115	3 May– 12 Jul	3 Jun ±13	20 5 Jun 69	193	20 Jul– 20 Oct	10 Sep ±14	6 25 Aug 87[c]	0	0
Least Flycatcher *E. minimus*	84	7	17 May– 8 Jul	5 Jun ±16	1 17 May 85[c]	77	17 Aug– 22 Nov	24 Sep ±18	4 29 Sep 76	0	0
Hammond's Flycatcher *E. hammondii*	142	111	30 Mar– 17 Jun	8 May ±15	12 9 May 77	31	1 Aug– 28 Oct	26 Sep ±18	3 4 Oct 86[c]	0	0
Dusky Flycatcher *E. oberholseri*	94	76	14 Apr– 10 Jun	8 May ±14	8 9 May 69	18	1 Aug– 21 Oct	15 Sep ±17	1 27 Sep 89[c]	0	0
Gray Flycatcher *E. wrightii*	93	79	18 Apr– 26 May	4 May ±10	7 21 Apr 77	14	24 Aug– 14 Oct	13 Sep ±15	3 6 Sep 85	0	0
Western Flycatcher *E. difficilis/occidentalis*	861	223	30 Mar– 14 Jul	26 May ±20	50 5 Jun 69[c]	638	18 Jul– 14 Nov	11 Sep ±14	50 18 Sep 71	0	0
Black Phoebe *Sayornis nigricans*	247	9	4 Mar– 8 May	4 Apr ±24	7 2 Mar 87[c]	221	21 Jul– 18 Dec	10 Oct ±23	10 4 Oct 68	17	40
Eastern Phoebe *S. phoebe*	16	3	18 May– 6 Jun	27 May ±10	1 27 May 82[c]	13	24 Sep– 21 Nov	5 Nov ±17	2 6 Nov 72	0	0

(Continued)

Table 1 (*Cont.*)

Species	Total	Spring				Fall				Winter	
		Seasonal Total	Date Range	Mean ±S.D.	High Count and Date	Seasonal Total	Date Range	Mean ±S.D.	High Count and Date	Total	Residents
Say's Phoebe	184	8[b]	22 Feb–14 May	6 Apr ±32	1 4 Mar 84[c]	176	22 Jul–3 Nov[b]	24 Sep[b] ±13	10 29 Sep 68	0[b]	3
S. saya											
Ash-throated Flycatcher	189	67	16 Apr–10 Jul	1 Jun ±17	6 12 Jun 75	121	16 Jul–20 Nov	29 Aug ±23	7 16 Aug 87	1	0
Myiarchus cinerascens											
Great Crested Flycatcher[f]	9	0	—	—	0	9	5 Sep–13 Oct	29 Sep ±12	1 27 Sep 89[c]	0	0
M. crinitus											
Brown-crested Flycatcher	1	0	—	—	0	1	17 Sep	17 Sep —	1 18 Sep 83[c]	0	0
M. tyrannulus											
Tropical Kingbird	8[g]	0	—	—	0	8[g]	7 Aug–18 Nov[b]	11 Oct[b] ±32	1 19 Oct 87[c]	0	0
Tyrannus melancholicus											
Cassin's Kingbird	1	0	—	—	0	1	25 Aug	25 Aug —	1 25 Aug 83	0	0
T. vociferans											
Western Kingbird	150	57	29 Mar–7 Jul	5 May ±27	11 29 Mar 86	93	18 Jul–20 Oct	6 Sep ±22	5 19 Oct 69	0	0
T. verticalis											
Eastern Kingbird	30	8	12 May–26 Jun	6 Jun ±16	2 19 Jun 82[c]	22	3 Aug–28 Sep	4 Sep ±13	2 3 Sep 89	0	0
T. tyrannus											
Scissor-tailed Flycatcher[f]	2	1	18 May	18 May —	1 19 May 73[c]	1	30 Sep	30 Sep —	1 30 Sep 85	0	0
T. forficatus											
Horned Lark	98	9	1 Mar–21 Jun	26 Apr ±45	2 6 Mar 78[c]	89	13 Sep–19 Dec	22 Oct ±15	16 16 Oct 81	0	0
Eremophila alpestris											
Purple Martin	20	6	28 May–17 Jun	10 Jun ± 8	1 10 Jun 77[c]	14	11 Aug–4 Oct	3 Sep ±13	2 26 Aug 89[c]	0	0
Progne subis											
Tree Swallow	113	78[b]	24 Feb–10 Jun	5 Apr ±24	11 27 Mar 82[c]	35	20 Jul–8 Dec	25 Sep ±33	2 30 Oct 88[c]	0[b]	0
Tachycineta bicolor											
Violet-green Swallow	676	43[b,e]	3 Feb–11 Jul	12 Apr ±32	9 29 Mar 86	633	20 Jul–18 Dec	7 Oct ±15	100 4 Oct 81	0[b]	0
T. thalassina											

N. Rough-winged Swallow *Stelgidopteryx serripennis*	228	26	9 Mar– 19 Jun[b]	23 May ±23	4 12 Jun 74	202	2 Aug– 4 Oct	31 Aug ±14	15 8 Sep 72	0	0
Bank Swallow *Riparia riparia*	26	14	3 May– 15 Jun	20 May ±12	2 17 May 84[c]	12	17 Aug– 27 Oct	11 Sep ±25	5 17 Aug 85	0	0
Cliff Swallow *Hirundo pyrrhonota*	109	21	14 Apr– 22 Jun	19 May ±20	3 9 May 76[c]	88	17 Jul– 8 Nov	16 Sep ±22	6 25 Oct 69	0	0
Barn Swallow *H. rustica*	535	184	5 Apr– 8 Jul	18 May ±20	5 8 May 74	351	21 Jul– 11 Nov	20 Sep ±19	21 12 Aug 88	0	0
Clark's Nutcracker *Nucifraga columbiana*	4	0	—	—	0	4	28 Sep– 27 Oct	10 Oct ±12	1 12 Oct 86[c]	0	0
Common Raven *Corvus corax*	1	1	18 Apr	18 Apr —	1 18 Apr 72	0	—	—	0	0	0
Red-breasted Nuthatch *Sitta canadensis*	875	25	12 Apr– 8 Jul	23 May ±21	3 7 May 78	850	24 Jul– 6 Dec	26 Sep ±20	75 15 Sep 69	0	0
White-breasted Nuthatch *S. carolinensis*	2	1	15 May	15 May —	1 15 May 79	1	10 Oct	10 Oct —	1 11 Oct 69[c]	0	0
Pygmy Nuthatch *S. pygmaea*	1	0	—	—	0	1	6 Aug	6 Aug —	1 6 Aug 69	0	0
Brown Creeper *Certhia americana*	120	2	14 Apr– 13 Jun	14 May ±42	1 18 Apr 78[c]	118	27 Sep– 19 Nov	26 Oct ± 9	8 19 Oct 86[c]	0	0
Rock Wren[e] *Salpinctes obsoletus*	191	20	4 Mar– 26 Jun	26 Apr ±31	9[e] 13 Jun 71	170	19 Aug– 22 Nov	1 Oct ±18	12 11 Nov 72[c]	1	55
Bewick's Wren *Thryomanes bewickii*	3	0	—	—	1 31 Mar 82[c]	3	2 Oct– 2 Nov	16 Oct ±16	1 19 Dec 81[c]	0	1
House Wren *Troglodytes aedon*	138	34[e]	11 Mar– 12 Jul	4 May ±34	2 23 Apr 87[c]	104	18 Jul– 30 Oct	14 Sep ±22	4 18 Oct 72	0	1
Winter Wren *T. troglodytes*	130	17	14 Mar– 20 Jun	15 Apr ±29	1 7 Apr 86[c]	109	6 Aug– 25 Nov	25 Sep ±23	3 21 Oct 72	4	1
Marsh Wren *Cistothorus palustris*	21	2	1 Apr– 8 Jun	5 May ±48	1 1 Apr 87[c]	19	15 Aug– 4 Nov	24 Sep ±21	2 16 Aug 87[c]	0	0

(Continued)

Table 1 (*Cont.*)

Species	Total	Spring				Fall				Winter	
		Seasonal Total	Date Range	Mean ±S.D.	High Count and Date	Seasonal Total	Date Range	Mean ±S.D.	High Count and Date	Total	Residents
Dusky Warbler[e,f] *Phylloscopus fuscatus*	2	0	—	—	0	2	27 Sep–14 Oct	6 Oct ±10	1 14 Oct 87[c]	0	0
Golden-crowned Kinglet *Regulus satrapa*	752	79	7 Mar–27 Jun[b]	1 Apr ±19	18 16 Mar 74	673	17 Sep–8 Dec	17 Oct ±12	40 23 Oct 84	0	0
Ruby-crowned Kinglet *R. calendula*	3152	1212	8 Mar–30 Jun	15 Apr ±16	225 16 Apr 83	1931	4 Sep–19 Dec	11 Oct ±13	200 2 Oct 84	9	4
Blue-gray Gnatcatcher *Polioptila caerulea*	16	4	14 Apr–2 May	23 Apr ± 9	1 17 Apr 89[c]	12	13 Aug–4 Oct	10 Sep ±16	2 8 Sep 72	0	0
Red-flanked Bluetail[f] *Tarsiger cyanurus*	1	0	—	—	0	1	1 Nov	1 Nov —	1 1 Nov 89	0	0
Northern Wheatear[f] *Oenanthe oenanthe*	2	1	11 Jun	11 Jun —	1 11 Jun 71	1	6 Nov	6 Nov —	1 10 Nov 88[c]	0	0
Western Bluebird *Sialia mexicana*	2	1	1 Apr	1 Apr —	1 2 Apr 88[c]	1	14 Oct	14 Oct —	1 15 Oct 87[c]	0	0
Mountain Bluebird *S. currucoides*	13	4	3 Apr–16 Jun	30 Apr ±33	1 13 Apr 75[c]	9	12 Oct–26 Nov	3 Nov ±15	3 15 Nov 86	0	0
Townsend's Solitaire[e] *Myadestes townsendi*	23	3	12 Apr–5 Jun	5 May ±28	1 5 Jun 89[c]	15	11 Sep–3 Nov	12 Oct ±15	2 4 Oct 86	5	0
Veery[f] *Catharus fuscescens*	3	1	28 May	28 May	1 28 May 81	2	26 Sep–20 Oct	8 Oct ±17	1 29 Sep 85[c]	0	0
Gray-cheeked Thrush[f] *C. minimus*	10	2	28 May–11 Jun	4 Jun ±10	1 11 Jun 75[c]	8	12 Sep–17 Oct	29 Sep ±11	2 3 Oct 70	0	0
Swainson's Thrush *C. ustulatus*	1162	168	17 Apr–12 Jul	26 May ±13	35 28 May 71	994	27 Aug–24 Nov	25 Sep ±12	60 22 Sep 71	0	0
Hermit Thrush *C. guttatus*	2065	374	1 Mar–2 Jul	25 Apr ±20	25 11 May 71[c]	1641	1 Sep–18 Dec	10 Oct ±15	350 2 Oct 72	50	11

American Robin	1130	216	4 Mar–	2 Apr	40	585	21 Jul–	15 Nov[b]	50	329	10
Turdus migratorius			27 Jun	±23	4 Apr 73		19 Dec[b]	±25	16 Dec 83		·
Varied Thrush	443	123	1 Mar–	7 Apr	22	289	27 Sep–	3 Nov	30	31	0
Ixoreus naevius			15 Jun	±23	4 Apr 73		19 Dec	±20	20 Oct 72		
Gray Catbird[f]	4	2	29 May–	11 Jun	1	2	15 Oct	15 Oct	1	0	0
Dumetella carolinensis			24 Jun	±18	24 Jun 85[c]			± 0	15 Oct 82[c]		
Northern Mockingbird	180	52	3 Apr–	1 Jun	2	127	15 Jul–	8 Sep	4	1	0
Mimus polyglottos			9 Jul	±27	21 Jun 82[c]		23 Nov	±31	10 Aug 74		
Sage Thrasher	48	9	19 Apr–	22 May	1	38	12 Aug–	1 Oct	3	1	0
Oreoscoptes montanus			18 Jun	±19	24 May 80[c]		10 Nov	±18	3 Oct 84		
Brown Thrasher	16	7	1 May–	5 Jun	1	9	22 Sep–	12 Oct	2	0	1
Toxostoma rufum			2 Jul	±21	4 May 89[c]		30 Oct	±13	9 Oct 74		
Bendire's Thrasher	5	3	17 Apr–	27 May	1	2	21 Aug–	27 Aug	1	0	0
T. bendirei			14 Jul	±45	19 May 84[c]		2 Sep	± 8	22 Aug 76[c]		
White/Black-backed Wagtail[e,f]	1	0	—	—	0	1	10 Oct	10 Oct	1	0	0
Motacilla alba/lugens								—	10 Oct 74		
Red-throated Pipit[f]	6[g]	0	—	—	0	6[g]	24 Sep–	12 Oct	1	0	0
Anthus cervinus							3 Nov	±16	14 Oct 89[c]		
American Pipit	2584	23	5 Mar–	28 Apr[b]	2	2558	6 Sep–	20 Oct	110	3	0
A. rubescens			3 Jul[b]	±20	25 Apr 89[c]		19 Dec	±16	27 Oct 88		
Sprague's Pipit[f]	3	0	—	—	0	3	1 Oct–	9 Oct	1	0	0
A. spragueii							16 Oct	± 8	16 Oct 87[c]		
Bohemian Waxwing	1	0	—	—	0	1	28 Nov	28 Nov	1	0	0
Bombycilla garrulus								—	28 Nov 68		
Cedar Waxwing	859	88	4 May–	29 May	10	760	16 Jul–	9 Oct	75	11	0
B. cedrorum			20 Jun	± 9	30 May 82		19 Dec	±22	24 Oct 88		
Phainopepla	3	0	—	—	0	3	1 Sep–	12 Sep	1	0	0
Phainopepla nitens							26 Sep	±13	26 Sep 84[c]		
Brown Shrike[f]	1	0	—	—	0	1	20 Sep	20 Sep	1	0	0
Lanius cristatus								—	22 Sep 84[c]		

(Continued)

Table 1 (*Cont.*)

Species	Total	Spring				Fall				Winter	
		Seasonal Total	Date Range	Mean ±S.D.	High Count and Date	Seasonal Total	Date Range	Mean ±S.D.	High Count and Date	Total	Residents
Northern Shrike	1	0	—	—	0	1	29 Oct	29 Oct	1	0	0
L. excubitor								—	29 Oct 71		
Loggerhead Shrike	11	5	3 Apr–24 May	27 Apr ±19	1	6	13 Aug–11 Sep	21 Aug ±16	1	0	1
L. ludovicianus					20 Apr 83[c]				2 Sep 85[c]		
European Starling[e]	32,659	128	5 Mar–14 Jul	24 Apr ±43	140	30,141	16 Jul–19 Dec	3 Nov ±18	2540	2390	2513
Sturnus vulgaris					8 Mar 76				5 Nov 82		
White-eyed Vireo[f]	1	1	4 Jun	4 Jun	1	0	—	—	0	0	0
Vireo griseus				—	5 Jun 69[c]						
Solitary Vireo	167	48	22 Mar–5 Jul	25 Apr ±18	5	119	4 Aug–2 Nov	12 Sep ±20	7	0	0
V. solitarius					21 Apr 87				22 Aug 70		
Eastern Solitary Vireo	21	0	—	—	0	21	25 Aug–2 Nov	28 Sep ±16	2	0	0
V. s. solitarius									13 Sep 87[c]		
Cassin's Solitary Vireo	119	44	22 Mar–21 May	22 Apr ±13	5	75	4 Aug–25 Oct	5 Sep ±19	7	0	0
V. s. cassinii					21 Apr 87				22 Aug 70		
Yellow-throated Vireo[f]	1	1	12 Jun	12 Jun	1	0	—	—	0	0	0
V. flavifrons				—	13 Jun 69[c]						
Hutton's Vireo	45	12[b]	23 Feb–20 May	21 Apr[b] ±24	2	33	18 Jul–8 Nov	20 Sep ±29	2	0	0
V. huttoni					16 Apr 83				8 Nov 81		
Warbling Vireo	552	125	11 Mar–24 Jun	10 May ±16	12	427	21 Jul–20 Nov	12 Sep ±14	25	0	0
V. gilvus					25 May 70				11 Sep 77[c]		
Philadelphia Vireo[f]	10[g]	2	6 Jun–12 Jun	9 Jun ± 4	1	8[g]	12 Sep–25 Oct	26 Sep ±15	1	0	0
V. philadelphicus					6 Jun 89[c]				25 Oct 89[c]		
Red-eyed Vireo	62	41	22 May–2 Jul	10 Jun ± 9	2	21	28 Aug–6 Oct	15 Sep ±12	2	0	0
V. olivaceus					8 Jun 89[c]				6 Sep 85[c]		
Yellow-green Vireo[f]	3	0	—	—	0	3	19 Oct–30 Oct	25 Oct ± 6	1	0	0
V. flavoviridis									25 Oct 88[c]		

Golden-winged Warbler[f] *Vermivora chrysoptera*	4	2	18 Jun–5 Jul	27 Jun ±12	1 22 Jun 80[c]	2	2 Sep–14 Sep	8 Sep ± 8	1 2 Sep 80[c]	0	0
Tennessee Warbler *V. peregrina*	289	137[b]	22 Apr–17 Jul	2 Jun ±15	10 26 May 82	152[b]	18 Aug–16 Dec	1 Oct ±23	7 12 Sep 77	0	0
Orange-crowned Warbler *V. celata*	1526	1033[b]	19 Feb–3 Jul	30 Apr ±16	175 30 Apr 71	493[b]	16 Jul–23 Dec	20 Sep ±24	18 2 Oct 84	0[b]	1
Nashville Warbler *V. ruficapilla*	245	53	9 Apr–20 Jun	9 May ±17	3 28 Apr 68	192	31 Jul–11 Dec	7 Oct ±27	4 25 Oct 88	0	0
Virginia's Warbler *V. virginiae*	29	4	13 May–28 May	20 May ± 8	2 13 May 75	25	16 Aug–2 Nov	23 Sep ±18	3 1 Oct 68	0	0
Lucy's Warbler *V. luciae*	5	0	—	—	0	5	5 Sep–17 Nov	17 Oct ±30	1 1 Nov 88[c]	0	0
Northern Parula *Parula americana*	37	30	29 Apr–6 Jul	2 Jun ±16	3 12 Jun 85[c]	7	9 Sep–6 Oct	22 Sep ±12	1 10 Sep 88[c]	0	0
Yellow Warbler *Dendroica petechia*	1531	327	14 Apr–27 Jun	20 May ±11	60 17 May 85	1204	17 Jul–9 Nov	10 Sep ±15	43 9 Sep 88	0	0
Chestnut-sided Warbler *D. pensylvanica*	140	29	1 May–.. 3 Jul[b]	9 Jun ±12	3 1 Jun 74	111	2 Sep–3 Nov	22 Sep ±12	7 24 Sep 76	0	0
Magnolia Warbler *D. magnolia*	215	100	12 May–4 Jul	9 Jun ± 8	8 12 Jun 75[c]	115	22 Aug–5 Nov	26 Sep ±16	4 7 Sep 86	0	0
Cape May Warbler *D. tigrina*	52	29	26 May–30 Jun	12 Jun ± 9	3 19 Jun 77[c]	23	9 Sep–31 Oct	30 Sep ±14	2 22 Sep 79[c]	0	0
Black-throated Blue Warbler *D. caerulescens*	69	0	—	—	0	69	17 Sep–3 Nov	10 Oct ±10	3 14 Oct 87[c]	0	0
Yellow-rumped Warbler *D. coronata*	5327	1529[b]	1 Mar–15 Jul	18 Apr ±19	295 30 Apr 71	3501[b]	16 Jul–19 Dec	19 Oct[b] ±19	155 25 Oct 88	297	55
Myrtle Warbler *D. c. coronata* subspecies group	1802	197[b]	1 Mar–15 Jul	30 Apr ±23	45 30 Apr 71	1509[b]	13 Sep–19 Dec	23 Oct ±15	130 24 Oct 88	96	34
Audubon's × Myrtle Warbler	69	11	25 Mar–8 May	11 Apr ±16	4 26 Mar 69	56	22 Sep–3 Dec	14 Oct ±14	3 24 Oct 88	2	1

(Continued)

Table 1 (*Cont.*)

Species	Total	Spring				Fall				Winter	
		Seasonal Total	Date Range	Mean ±S.D.	High Count and Date	Seasonal Total	Date Range	Mean ±S.D.	High Count and Date	Total	Residents
Audubon's Warbler	3152	1260	5 Mar–13 Jul	16 Apr ±16	250 30 Apr 71	1807[b]	16 Jul–19 Dec	15 Oct[b] ±19	68 3 Oct 68	85	14
D. c. auduboni subspecies group											
Black-throated Gray Warbler	317	49	22 Mar–3 Jun	23 Apr ±15	6 21 Apr 82	268	26 Jul–29 Nov	18 Sep ±21	8 17 Sep 74	0	0
D. nigrescens											
Townsend's Warbler	1548	783	4 Apr–8 Jun	11 May ±10	75 8 May 69	765	3 Aug–17 Dec	16 Sep ±22	24 5 Sep 69	0	0
D. townsendi											
Townsend's × Hermit Warbler	2	1	17 Apr	17 Apr	1 17 Apr 74	1	24 Sep	24 Sep —	1 24 Sep 79	0	0
Hermit Warbler	262	61	15 Apr–27 May	8 May ± 9	4 30 Apr 89[c]	201	22 Jul–20 Nov[b]	30 Aug ±19	8 9 Aug 73[c]	0	0
D. occidentalis											
Black-throated Green Warbler	32	15	9 May–18 Jun	3 Jun ±11	3 24 May 83	17	8 Sep–23 Nov	16 Oct ±22	1 8 Sep 89[c]	0	0
D. virens											
Golden-cheeked Warbler[f]	1	0	—	—	0	1	9 Sep	9 Sep —	1 9 Sep 71	0	0
D. chrysoparia											
Blackburnian Warbler	52	6	31 May–9 Jul	13 Jun ±14	1 12 Jun 89[c]	46	2 Sep–30 Oct	30 Sep ±17	3 25 Sep 76	0	0
D. fusca											
Yellow-throated Warbler[e,f]	5	3	2 May–8 Jul	4 Jun ±34	1 7 May 80[c]	2	16 Sep–21 Oct	4 Oct ±25	1 21 Oct 86[c]	0	0
D. dominica											
Pine Warbler[f]	4	0	—	—	0	4	21 Sep–18 Nov	19 Oct ±24	1 19 Nov 87[c]	0	0
D. pinus											
Prairie Warbler	28	0	—	—	0	28	13 Aug–22 Nov	26 Sep ±27	2 11 Oct 84[c]	0	0
D. discolor											
Palm Warbler	814	29	14 Apr–3 Jul	5 Jun ±21	4 1 Jul 80	785	31 Aug–11 Dec	17 Oct ±16	20 14 Oct 87	0	3
D. palmarum											

Western Palm Warbler	810	25	3 May–	8 Jun	4	785	31 Aug–	17 Oct	20	0	3
D. p. palmarum			3 Jul	±18	1 Jul 80		11 Dec	±16	14 Oct 87		
Yellow Palm Warbler	4	4	14 Apr–	18 May	1	0	—	—	0	0	0
D. p. hypochrysea			26 Jun	±30	20 May 87[c]						
Bay-breasted Warbler	51	28	28 May–	12 Jun	2	23	10 Sep–	28 Sep	2	0	0
D. castanea			29 Jun	±10	21 Jun 82[c]		24 Oct	±11	27 Sep 74[c]		
Blackpoll Warbler	531	41	6 May–	12 Jun	2	490	22 Jul–	22 Sep[b]	23	0	0
D. striata			12 Jul	±16	28 Jun 77[c]		16 Nov[b]	±12	27 Sep 74		
Cerulean Warbler[f]	1	0	—	—	0	1	23 Oct	23 Oct	1	0	0
D. cerulea								—	24 Oct 81[c]		
Black-and-white Warbler	95	48	18 Apr–	31 May	5	47	11 Aug–	19 Sep	2	0	0
Mniotilta varia			7 Jul	±17	6 Jun 75		11 Nov	±18	8 Sep 89[c]		
American Redstart	379	69	21 May–	13 Jun	3	310	16 Aug–	19 Sep	15	0	0
Setophaga ruticilla			7 Jul	± 9	15 Jun 77[c]		8 Nov	±15	15 Sep 75		
Prothonotary Warbler[f]	2	0	—	—	0	2	12 Sep–	3 Oct	1	0	0
Protonotaria citrea							23 Oct	±29	23 Oct 89[c]		
Worm-eating Warbler[f]	8	6	28 May–	6 Jun	2	2	12 Oct–	14 Oct	1	0	0
Helmitheros vermivorus			20 Jun	± 9	5 Jun 73		16 Oct	± 3	16 Oct 87[c]		
Ovenbird	262	161[b]	16 May–	12 Jun	6	101[b]	19 Aug–	22 Sep	4	0	0
Seiurus aurocapillus			21 Jul	±12	16 Jun 88		8 Nov	±15	13 Sep 81		
Northern Waterthrush	66	5	20 May–	8 Jun	1	61	10 Aug–	12 Sep	2	0	0
S. noveboracensis			27 Jun	±14	27 Jun 89[c]		27 Oct	±18	17 Aug 89[c]		
Kentucky Warbler[f]	11[g]	10[g]	9 May–	9 Jun[b]	1	1	9 Sep	9 Sep	1	0	0
Oporornis formosus			14 Jul	±22	17 Jun 88[c]			—	10 Sep 88[c]		
Connecticut Warbler[f]	29	2	18 Jun–	19 Jun	1	27	1 Sep–	23 Sep	3	0	0
O. agilis			19 Jun	± 1	19 Jun 76[c]		12 Oct	±12	23 Sep 74		
Mourning Warbler[f]	35[g]	5	3 Jun–	14 Jun	1	30[g]	27 Aug–	17 Sep	4	0	0
O. philadelphia			27 Jun	±10	15 Jun 88[c]		20 Oct	±13	8 Sep 89		
MacGillivray's Warbler	340	78	6 Apr–	16 May	10	262	1 Aug–	4 Sep	6	0	0
O. tolmiei			23 Jun	±16	9 May 69[c]		20 Oct	±17	8 Sep 72		
Common Yellowthroat	851	383	11 Mar–	21 May	10	468	15 Jul–	22 Sep	16	0	0
Geothlypis trichas			14 Jul	±28	21 Apr 87		3 Nov	±16	2 Oct 84		

(Continued)

Table 1 (*Cont.*)

Species	Total	Spring				Fall				Winter	
		Seasonal Total	Date Range	Mean ±S.D.	High Count and Date	Seasonal Total	Date Range	Mean ±S.D.	High Count and Date	Total	Residents
Hooded Warbler *Wilsonia citrina*	23	18	18 May–1 Jul	5 Jun ±12	1 5 Jun 89[c]	5	1 Sep–11 Oct	27 Sep ±15	1 11 Oct 89[c]	0	0
Wilson's Warbler *W. pusilla*	3700	2818[b]	18 Mar–27 Jun	13 May ±11	500 8 May 69	882[b]	13 Jul–5 Nov	2 Sep ±17	20 14 Sep 75[c]	0	0
Canada Warbler *W. canadensis*	37	9	5 Jun–26 Jun	12 Jun ± 6	1 26 Jun 89[c]	28	8 Aug–26 Oct	16 Sep ±19	2 8 Sep 89[c]	0	0
Yellow-breasted Chat *Icteria virens*	76	30	14 Apr–22 Jun	12 May ±15	2 20 May 76[c]	46	12 Aug–20 Oct	11 Sep ±15	3 26 Aug 87[c]	0	0
Hepatic Tanager *Piranga flava*	2	1	22 May	22 May	1 22 May 77	1	11 Nov	11 Nov —	1 11 Nov 79	0	0
Summer Tanager *P. rubra*	16	10	15 May–24 Jun	2 Jun ±13	1 5 Jun 89[c]	6	12 Oct–29 Oct	23 Oct ± 7	1 13 Oct 89[c]	0	0
Scarlet Tanager[f] *P. olivacea*	5	1	18 Jun	18 Jun —	1 19 Jun 80[c]	4	29 Sep–26 Nov	29 Oct ±24	1 26 Nov 87[c]	0	0
Western Tanager *P. ludoviciana*	537	169	15 Apr–22 Jun	18 May ±13	30 8 May 69	368	18 Jul–25 Nov[b]	10 Sep ±17	12 8 Sep 72	0	0
Rose-breasted Grosbeak *Pheucticus ludovicianus*	216	136	13 May–11 Jul	9 Jun ±10	6 9 Jun 77[c]	80	17 Jul–9 Nov	20 Sep ±22	3 2 Oct 75[c]	0	0
Rose-br. × Black-hd. Grosbeak[e]	4	1	8 Jun	8 Jun —	1 8 Jun 70	3	18 Sep–21 Oct	2 Oct ±17	1 21 Oct 88	0 [c]	0
Black-headed Grosbeak *P. melanocephalus*	255	120	2 Apr–14 Jul	12 May ±18	10 9 May 69[c]	135	23 Jul–20 Nov[b]	4 Sep ±20	4 9 Sep 80	0	0
Blue Grosbeak *Guiraca caerulea*	53	9	9 May–18 Jun	26 May ±14	1 20 May 88[c]	44	16 Aug–6 Oct	5 Sep ±11	2 15 Sep 89[c]	0	0
Lazuli Bunting *Passerina amoena*	294	62	6 Apr–1 Jul	15 May ±19	4 11 May 69[c]	232	31 Jul–8 Nov	7 Sep ±15	20 18 Sep 71	0	0

Indigo Bunting	110	77	7 May–14 Jul	8 Jun ±14	6 20 Jun 82	33	18 Jul–13 Dec	14 Sep ±44	2 3 Sep 86	0	0
P. cyanea											
Painted Bunting[f]	5	0	—	—	0	5	10 Sep–28 Sep	20 Sep ± 8	1 23 Sep 86[c]	0	0
P. ciris											
Dickcissel	25	13	13 May–24 Jun	1 Jun ±13	1 30 May 87[c]	12	24 Aug–14 Oct	16 Sep ±18	2 3 Sep 88[c]	0	0
Spiza americana											
Green-tailed Towhee	26	7	3 May–26 Jun	24 May ±20	1 29 Jun 77[c]	19	24 Aug–11 Nov	18 Sep ±19	1 18 Sep 88[c]	0	0
Pipilo chlorurus											
Rufous-sided Towhee[e]	470	30[b]	23 Feb–1 Jun[b]	13 Apr[b] ±19	4 4 Apr 73	440	29 Aug–17 Dec	6 Oct ±11	125 4 Oct 72[c]	0[b]	0
P. erythrophthalmus											
Cassin's Sparrow[f]	10	4	2 Jun–11 Jul	18 Jun ±17	1 6 Jul 82[c]	6	13 Sep–1 Oct	22 Sep ± 7	2 30 Sep 85[c]	0	0
Aimophila cassinii											
American Tree Sparrow	61	16	28 Mar–28 Jun	22 May ±26	2 24 May 77	44	3 Oct–22 Nov	24 Oct ±14	3 21 Oct 83[c]	1	0
Spizella arborea											
Chipping Sparrow	1526	255	16 Mar–13 Jul	10 May ±19	55 30 Apr 71	1271	21 Jul–30 Nov	17 Sep ±21	50 2 Oct 72	0	0
S. passerina											
Chipping x Brewer's Sparrow	1	0	—	—	0	1	26 Oct	26 Oct —	1 28 Oct 88[c]	0	0
Clay-colored Sparrow	312	36	4 May–22 Jun	28 May ±13	3 31 May 75	276	22 Aug–5 Dec	29 Sep ±20	10 28 Sep 89	0	0
S. pallida											
Brewer's Sparrow	125	30	21 Apr–27 Jun	24 May ±15	2 21 May 78	95	2 Aug–15 Nov	18 Sep ±18	8 29 Sep 74[c]	0	0
S. breweri											
Field Sparrow[f]	1	1	17 Jun	17 Jun —	1 9 Jul 69[c]	0	—	—	0	0	0
S. pusilla											
Black-chinned Sparrow	1	0	—	—	0	1	30 Aug	30 Aug —	1 5 Sep 72[c]	0	0
S. atrogularis											
Vesper Sparrow	234	20	4 Apr–23 Jun	20 May ±20	1 7 Jun 89[c]	214	21 Jul–18 Nov	28 Sep ±16	7 6 Oct 72	0	0
Pooecetes gramineus											
Lark Sparrow	257	26	9 Mar–28 Jun	26 Apr ±26	2 9 Apr 82[c]	230	29 Jul–13 Dec	14 Sep ±21	8 1 Oct 74	1	0
Chondestes grammacus											
Black-throated Sparrow	23	7	17 Apr–18 Jun	21 May ±20	2 22 May 77	16	18 Aug–10 Oct	14 Sep ±13	2 8 Sep 84	0	0
Amphispiza bilineata											

(Continued)

Table 1 (*Cont.*)

Species	Total	Spring				Fall				Winter	
		Seasonal Total	Date Range	Mean ±S.D.	High Count and Date	Seasonal Total	Date Range	Mean ±S.D.	High Count and Date	Total	Residents
Sage Sparrow *A. belli*	8	5	24 Mar–22 Apr	9 Apr ±11	1 22 Apr 82[c]	3	18 Aug–25 Oct	24 Sep ±34	1 1 Oct 81[c]	0	0
Lark Bunting *Calamospiza melanocorys*	50	1	24 May	24 May —	1 24 May 77	49	17 Aug–20 Oct	14 Sep ±13	3 4 Sep 88[c]	0	0
Savannah Sparrow *Passerculus sandwichensis*	6732	184	4 Mar–19 Jun	25 Apr ±24	15 4 Apr 73	6548[b]	16 Jul–23 Dec	29 Sep ±14	1500 29 Sep 68	0[b]	1
Baird's Sparrow[f] *Ammodramus bairdii*	1	0	—	—	0	1	28 Sep	28 Sep —	1 28 Sep 69	0	0
Grasshopper Sparrow *A. savannarum*	93	23	28 Apr–2 Jul	30 May ±18	1 11 Jun 89[c]	70	20 Jul–29 Nov	8 Oct ±26	4 28 Sep 89[c]	0	0
Le Conte's Sparrow[f] *A. leconteii*	6	0	—	—	0	6	11 Sep–13 Oct	28 Sep ±14	1 7 Oct 89[c]	0	0
Sharp-tailed Sparrow *A. caudacutus*	1	0	—	—	0	1	27 Oct	27 Oct —	1 27 Oct 89	0	0
Fox Sparrow *Passerella iliaca*	1816	79	18 Mar–26 May	22 Apr ±15	6 4 Apr 73	1723	2 Sep–17 Dec	7 Oct ±17	200 3 Oct 72	14	30
Song Sparrow *Melospiza melodia*	57	12[b]	28 Feb–26 Jun[b]	23 Apr[b] ±29	1 29 Apr 87[c]	45	7 Sep–13 Dec	11 Oct ±20	5 2 Oct 84	0[b]	3
Lincoln's Sparrow *M. lincolnii*	1734	448[b]	28 Feb–16 Jun	20 Apr ±14	40 21 Apr 87	1286	2 Sep–4 Dec	30 Sep ±11	450 3 Oct 72	0[b]	0
Swamp Sparrow *M. georgiana*	53	6	21 Apr–25 Jun	22 May ±29	1 2 Jun 86[c]	47	28 Sep–16 Nov	18 Oct ±11	5 15 Oct 87	0	0
White-throated Sparrow *Zonotrichia albicollis*	180	8	22 Apr–7 Jul	22 May ±24	1 20 May 82[c]	172	8 Sep–17 Dec	21 Oct ±15	7 15 Oct 87	0	0
Golden-crowned Sparrow *Z. atricapilla*	9051	382	7 Mar–12 Jun	28 Apr ±12	65 1 May 71	8653	11 Sep–17 Dec	7 Oct ±10	3500 2 Oct 72	16	71

Golden- × White-cr. Sparrow	2	0	—	—	0	2	2 Oct–13 Oct	8 Oct ± 8	1 16 Oct 87[c]	0	0
White-crowned Sparrow *Z. leucophrys*	7237	808	8 Mar–1 Jul	19 Apr ±13	75 18 Apr 88	6413	27 Aug–19 Dec	6 Oct ±10	3000 3 Oct 72	16	17
Gambel's White-cr. Sparrow *Z. l. gambelii*	933	179	8 Mar–12 May	21 Apr ±10	60 18 Apr 88	753	9 Sep–18 Dec	10 Oct ±14	28 9 Oct 85	1	2
Black-lored White-cr. Sparrow *Z. l. leucophrys/oriantha*	11	3	31 May–1 Jul	18 Jun ±16	1 24 Jun 85[c]	8	24 Sep–1 Dec	19 Oct ±22	1 15 Oct 89[c]	0	0
Puget Sound White-cr. Sparrow *Z. l. pugetensis*	905	169	8 Mar–25 Jun	13 Apr ±14	25 5 Apr 86	736	10 Sep–4 Dec	6 Oct ±11	30 8 Oct 88	0	5
Harris' Sparrow *Z. querula*	19	2	2 May–16 May	9 May ±10	1 2 May 73[c]	17	17 Oct–4 Dec	6 Nov ±14	2 25 Oct 77[c]	0	0
Dark-eyed Junco *Junco hyemalis*	4030	1124	5 Mar–7 Jul	6 Apr ±15	420 4 Apr 73	2886	25 Jul–19 Dec	13 Oct ±14	700 3 Oct 72[c]	20	3
Slate-colored Junco *J. h. hyemalis* subspecies group	84	26	22 Mar–12 Jun	1 May ±24	1 3 Jun 89[c]	58	8 Sep–18 Dec	25 Oct ±19	3 15 Oct 87[c]	0	0
Oregon Junco[e] *J. h. oreganus* subspecies group	3946	1098[e]	5 Mar–7 Jul	5 Apr ±14	420 4 Apr 73	2828	25 Jul–19 Dec	13 Oct ±14	700 3 Oct 72[c]	20	3
Lapland Longspur *Calcarius lapponicus*	164	5	4 May–24 Jun	31 May ±22	1 5 May 87[c]	159	3 Sep–9 Dec	14 Oct ±18	10 5 Nov 87	0	0
Chestnut-collared Longspur *C. ornatus*	46	3[b]	18 May–16 Jul	20 Jun ±30	1 18 May 80[c]	43[b]	20 Sep–3 Dec	16 Oct ±13	7 14 Oct 87	0	0
Snow Bunting[f] *Plectophenax nivalis*	11[g]	0	—	—	0	11[g]	22 Oct–17 Nov	3 Nov[b] ± 9	3 29 Oct 74	0	0
Bobolink *Dolichonyx oryzivorus*	141	10	24 May–4 Jul	8 Jun ±13	1 25 Jun 83[c]	131	26 Aug–23 Oct	22 Sep ±13	6 24 Sep 74[c]	0	0
Red-winged Blackbird *Agelaius phoeniceus*	560	30	4 Mar–11 Jun	25 Apr ±24	3 8 May 71	529	20 Jul–18 Dec	4 Oct ±19	65 30 Sep 68	1	0
Tricolored Blackbird *A. tricolor*	22	5	8 Mar–14 Jul	12 May ±58	2 12 Jun 75[c]	16	21 Sep–30 Oct	7 Oct ±10	5 4 Oct 86	1	0
Western Meadowlark *S. neglecta*	1871[g]	41	9 Mar–5 Jul	30 Apr ±31	45 10 Mar 87	1813[g]	23 Jul–16 Dec	14 Oct ±17	125 4 Oct 72[c]	17	145

(Continued)

Table 1 (*Cont.*)

Species	Total	Spring				Fall				Winter	
		Seasonal Total	Date Range	Mean ±S.D.	High Count and Date	Seasonal Total	Date Range	Mean ±S.D.	High Count and Date	Total	Residents
Yellow-headed Blackbird	78	22	27 Apr–12 Jun	12 May ± 9	3 13 May 75[c]	56	27 Jul–21 Oct	11 Sep ±21	2 27 Aug 87[c]	0	0
Xanthocephalus xanthocephalus											
Rusty Blackbird	8	3	15 Apr–22 Apr	20 Apr ± 4	1 15 Apr 85[c]	5	20 Oct–19 Nov	31 Oct ±12	1 6 Nov 89[c]	0	0
Euphagus carolinus											
Brewer's Blackbird	773	139	16 Mar–30 Jun	26 Apr ±18	20 27 Apr 71	633	17 Jul–18 Dec	10 Oct ±14	50 3 Oct 72[c]	1	1
E. cyanocephalus											
Brown-headed Cowbird	2160	439	26 Mar–14 Jul	5 May ±14	20 7 May 78	1721	15 Jul–1 Dec	28 Aug ±20	53 26 Aug 87[c]	0	0
Molothrus ater											
Orchard Oriole	38	2	11 Jun–9 Jul	25 Jun ±20	1 11 Jun 88[c]	36	14 Aug–25 Oct	19 Sep ±16	3 16 Sep 72[c]	0	0
Icterus spurius											
Hooded Oriole	14	0	—	—	0	14	20 Jul–19 Nov[b]	1 Sep ±31	3 21 Aug 87[c]	0	0
I. cucullatus											
Northern Oriole	601	113[b]	26 Mar–20 Jun	3 May ±17	7 21 Apr 87	488[b]	3 Jul–30 Nov[b]	22 Aug ±23	15 9 Aug 73	0	0
I. galbula											
Baltimore Oriole	32	10	26 May–11 Jun	3 Jun ± 6	2 26 May 70	22	5 Sep–30 Nov[b]	4 Oct ±22	2 7 Sep 89[c]	0	0
I. g. galbula											
Baltimore × Bullock's Oriole	4	1	4 Jun	4 Jun —	1 4 Jun 70	3	20 Sep–28 Sep	23 Sep ± 4	1 29 Sep 79[c]	0	0
Bullock's Oriole	565	102[b]	26 Mar–20 Jun	30 Apr ±15	7 21 Apr 87	463[b]	3 Jul–27 Nov	19 Aug ±21	15 9 Aug 73	0	0
I. bullockii subspecies group											
Scott's Oriole	1	0	—	—	0	1	12 Sep	12 Sep —	1 12 Sep 77	0	0
I. parisorum											
Purple Finch	797	90	9 Mar–28 May	18 Apr ±16	7 12 Apr 88	703	18 Aug–14 Dec	12 Oct ±13	250 4 Oct 72	4	1
Carpodacus purpureus											

Cassin's Finch	7	3	12 Apr–	6 May	1	4	5 Oct–	1 Nov	1	0	0
C. cassinii			14 Jun	±34	21 Apr 87[c]		11 Dec	±29	11 Dec 89[c]		
House Finch	586	325	9 Mar–	21 Apr	23	251	19 Jul–	15 Oct	12	10	0
C. mexicanus			1 Jul	±24	26 Apr 83		15 Dec	±23	26 Oct 72[c]		
Red Crossbill	19	0	—	—	0	18	9 Aug–	29 Oct[b]	12	1	0
Loxia curvirostra							5 Nov[b]	±21	4 Nov 87		
Pine Siskin	1562	44	7 Mar–	23 Apr	8	1482	16 Jul–	12 Oct	400	36	1
Carduelis pinus			14 Jul	±36	17 Apr 74		19 Dec	±16	3 Oct 72		
Lesser Goldfinch	881	45[b]	28 Feb–	27 Apr	6	836	15 Jul–	29 Sep	50	0[b]	0
C. psaltria			11 Jul	±37	9 Mar 79		19 Dec	±23	22 Sep 79		
Lawrence's Goldfinch	16	3	8 Apr–	4 May	1	13	29 Sep–	9 Oct	6	0	0
C. lawrencei			26 May	±24	8 Apr 77		31 Oct	±10	1 Oct 74		
American Goldfinch	164	30	16 Apr–	18 May	5	134	21 Aug–	4 Oct	17	0	0
C. tristis			13 Jun	±15	15 May 75[c]		5 Nov	±14	3 Oct 86[c]		
Evening Grosbeak	4	1	27 May	27 May	1	3	20 Sep–	30 Sep	1	0	0
Coccothraustes vespertinus				—	27 May 74		3 Oct	± 9	22 Sep 79[c]		
House Sparrow[e]	177	170	14 Mar–	22 Apr	9	6	16 Jul–	25 Sep	7	1	0
Passer domesticus			21 Jun	±17	10 Apr 88		10 Dec	±48	24 Aug 89[c]		
Total	4,998,469	2,320,004				2,651,593				26,872	14,688

[a]Turnover rates of these species, most of which are wintering waterbirds, have been reassessed and totals for the period covered by DeSante and Ainley (1980) have been recalculated (see text). Differences between totals included here and those of DeSante and Ainley are presented in the notes following the table.

[b]Small numbers of individuals were reclassified to season using our definitions, are anomalously late or early within a season, or are known immature dispersants included in the spring totals. See the annotations for specification of these records and, in some cases, reinterpretations of seasonal data.

[c]Seasonal high count duplicated on more than one date; the date given is the most recent, chronologically.

[d]Patterns of arrival appear to overlap two or more seasons. See the notes for reinterpretations of seasonal data.

[e]See notes following the table for information on race, unusual patterns of occurrence, or individual records of interest.

[f]Species formerly or currently reviewed by the CBRC. All records included have either been accepted by the Committee or are in the process of being reviewed. It is possible that some records presently under review will not be accepted.

[g]One or more reported individuals are not included in the table because of inadequate documentation or a reinterpretation of arrival data. See notes following the table.

NOTES

Pacific Loon—A reinterpretation of arrival data for the period 3 April 1968 through 2 April 1976 results in a total of 386 arrivals vs. 351 reported for the same period by DeSante and Ainley (1980).

Common Loon—An arrival on 18 July 1984 was extremely early, the next earliest fall individual arriving on 22 August.

Red-necked Grebe—A reinterpretation of arrival data for the period from 3 April 1968 through 2 April 1976 results in a total of 32 individuals vs. 21 reported for the same period by DeSante and Ainley (1980). The arrival pattern of this species is perhaps more accurately represented by a single over-winter peak (mean arrival 14 January ± 53 days).

Eared Grebe—A reinterpretation of arrival data for the period from 3 April 1968 through 2 April 1976 results in a total of 3914 individuals vs. 3276 reported for the same period by DeSante and Ainley (1980). A single broad over-winter peak (mean arrival 9 January ± 50 days) may best define the arrival pattern of this species.

Black-footed Albatross—The summer occurrence of this species is best defined by the arrival of 130 individuals from 28 February through 12 August (mean arrival 20 May ± 30 days). The remaining 12 records were widely scattered between 3 September and 31 January.

Northern Fulmar—The arrival pattern is perhaps better defined as follows: fall, 27 September–31 December (mean arrival 1 December ± 21 days; n = 2088); spring, 3 January–23 March (mean arrival 4 February ± 17 days; n = 1277). The remaining 43 individuals were summering birds recorded from 16 April to 16 August.

Sooty Shearwater—The summer occurrence of this species is probably best defined by 4,124,086 individuals that were observed between 6 March and 24 November (mean arrival 12 July ± 49 days). Arrivals of the remaining 1716 individuals were scattered over the winter.

Fork-tailed Storm-Petrel—The totals do not include a long-dead specimen found on 22 August 1971.

Black Storm-Petrel—This species was recorded only during El Niño of 1983.

Brown Pelican—The occurrence of this species is perhaps best defined by a single long peak of 264,801 individuals arriving between 11 May and 31 December (mean arrival 20 September ± 40 days). The remaining 3265 arrivals were widely scattered through the winter and early spring. Numbers of arrivals were calculated by means of an algorithim similar to that used for landbirds, but with 10 days rather than one day as the unit of measure. This resulted in numbers higher than were calculated by DeSante and Ainley (1980), who assumed that the high count of each season was the total. We have virtually no data on daily turnover rates of this species, but our calculations are based on the assumption that roost sites are used by both summer residents and migrants dispersing farther north.

Magnificent Frigatebird—We assume that an adult male recorded on 16 December 1988 was of this species although the possibility that it was a Great Frigatebird (*Fregata minor*) cannot be ruled out, especially because Magnificent Frigatebirds are not typically found in California at this time of year. The other three recent records were of females identified as Magnificent Frigatebirds by their plumage.

Great Blue Heron—The occurrence of this species is perhaps better defined by 126 individuals that arrived between 17 June and 2 November (mean arrival 30

August ± 30 days). The remaining five arrivals were in December (3) and March (2). The three winter residents all refer to one individual that was present between 26 August 1985 and 18 January 1988, departing the island for 2–3 months each summer.

Cinnamon Teal—This species' early spring occurrence is best defined by the 19 individuals arriving from 30 January to 2 March (mean arrival 19 February ± 14 days).

Oldsquaw—The mean winter date of all records was 31 December ± 47 days.

Surf Scoter—A reinterpretation of arrival data for the period from 3 April 1968 through 2 April 1976 results in a total of 1631 individuals vs. 1264 reported for the same period by DeSante and Ainley (1980). Three arrivals between 16 and 23 July 1978 were anomalously early; the next fall record was 5 September. Arrivals or migrants of this species were recorded throughout the winter, thus its seasonal occurrence is perhaps best defined by two peaks: fall, 5 September–31 December (mean arrival 16 November ± 21 days; n = 2020), and spring, 5 January–18 June (mean arrival 23 March ± 32 days; n = 2291).

White-winged Scoter—As with the Surf Scoter, the arrival pattern is perhaps best defined by two peaks spanning the winter: fall, 14 September–29 December (mean arrival 9 November ± 21 days; n = 192), and spring, 2 January–6 July (mean arrival 19 March ± 34 days; n = 254).

Common Goldeneye—Four on 4 February 1988 was the high count.

Barrow's Goldeneye—The only record for the island was for 1 January 1977.

Red-breasted Merganser—A reinterpretation of arrival data for the period from 3 April 1968 through 2 April 1976 results in a total of 78 individuals vs. 54 reported for the same period by DeSante and Ainley (1980). A single over-winter peak (mean arrival 2 January ± 46 days) may best define this species' arrival pattern.

Peregrine Falcon—A reinterpretation of arrival data for the period from 3 April 1968 through 2 April 1976 results in a total of 52 individuals vs. 39 reported for the same period by DeSante and Ainley (1980). The determination of arrivals, especially in winter, is difficult because winter residents are known to commute regularly between the island and the adjacent coast. Most late fall and winter arrivals were immatures that were distinguished from the residents by distinctive plumage features and were recorded on one day only.

Semipalmated Plover—A bird present on the island 13–15 September 1985 was submitted to the CBRC as possibly a Common Ringed-Plover (*Charadrius hiaticula*). The CBRC thought it more probably a Semipalmated Plover (Bevier 1990), and it is included as such in the table.

Killdeer—The high count for the island is of 28 birds recorded on 31 December 1978.

Wandering Tattler—A reinterpretation of arrival data for the period from 3 April 1968 through 2 April 1976 results in a total of 559 individuals vs. 529 reported for the same period by DeSante and Ainley (1980).

Upland Sandpiper—A bird reported on 23 May 1969 has not been reviewed by the CBRC and is not included in Table 1.

Long-billed Curlew—DeSante and Ainley (1980) listed five records of this species, including individuals present 8 August to 26 November 1970 and 7–11 September 1972. Because of this species' subsequent rarity on the island, we now believe these to have been the same individuals recorded 18–20 July 1970 and 30 August 1972, respectively, having been missed because of observer rotations.

Ruddy Turnstone—A reinterpretation of arrival data for the period from 3 April 1968 through 2 April 1976 results in a total of 72 individuals vs. 56 reported for the same period by DeSante and Ainley (1980).

Black Turnstone—A reinterpretation of arrival data for the period from 3 April 1968 through 2 April 1976 results in a total of 1281 individuals vs. 994 reported for the same period by DeSante and Ainley (1980).

Dunlin—A bird reported on 29 August 1975 was not described. Because it is unseasonal we excluded the record from Table 1.

Herring Gull—A reinterpretation of arrival data for the period from 3 April 1968 through 2 April 1976 results in a total of 1134 individuals vs. 814 reported for the same period by DeSante and Ainley (1980). One present on 12 July 1977 was an anomalous summer arrival; the next latest spring record was for 31 May. The occurrence of this species is perhaps best represented by a single winter peak with a mean arrival date of 25 January ± 47 days, and a high count of 200 birds on 28 February 1977.

Thayer's Gull—One on 30 May 1978 was late, the next latest spring record being for 29 April. A single winter peak (mean arrival 11 January ± 52 days; high count 12 birds on 8 February 1980) may better represent the occurrence of this species.

Glaucous-winged Gull—A reinterpretation of arrival data for the period from 3 April 1968 through 2 April 1976 results in a total of 3117 individuals vs. 1912 reported for the same period by DeSante and Ainley (1980). One on 13 August 1982 was an anomalous summer arrival; the next earliest fall record was for 12 September. A single winter peak (mean arrival 28 January ± 40 days) may best represent the occurrence of this species.

Glaucous Gull—The single winter arrival mean for this species was 27 January ± 50 days, and the high count was of two birds on 3 and 4 February 1979.

Sabine's Gull—One on 26 March 1980 was early, the next earliest spring record being for 22 April.

Xantus' Murrelet—The totals do not include a long-dead specimen found on 19 May 1971.

Ancient Murrelet—The occurrence of this species is perhaps best defined by a single winter peak (mean arrival 27 December ± 39 days; high count 45 birds on 28 January 1987), although this pattern varies from year to year.

Great Horned Owl—The lack of records since 1970 may have resulted from the eradication of rabbits from the island in 1973 and 1974. It is likely that this shortened visits by arrivals, decreasing their detectability.

Burrowing Owl—An owl heard on the night of 31 August 1968, which was thought possibly to be of this species, has been excluded from the table as it would represent an extremely early fall migrant.

Ruby-throated Hummingbird—Not included in the table is an immature female hummingbird captured and identified as this species on 12 September 1986. Although the plumage and most measurements indicated a Ruby-throated Hummingbird, the tail measurement fell outside of the known range for this species. The CBRC is currently evaluating the record.

Selasphorus Hummingbirds—Six arrivals, Allen's Hummingbirds on 5 February 1984 and 26 February 1980, Rufous Hummingbirds on 15 February 1977, 23 February 1976, and 25 February 1988, and an unidentified individual of this species pair on 3 February 1976, were considered early spring arrivals rather than winter

visitants. The next earliest spring arrivals were 2 March for Rufous Hummingbird and 9 March for Allen's Hummingbird.

Lewis' Woodpecker—Because of the extreme rarity of this species on the island and its habit there of foraging on inaccessible rocky slopes, the bird seen on 2 May 1968, listed as an arrival by DeSante and Ainley (1980), is here considered to be one of two birds present on 29 and 30 April 1968.

Willow Flycatcher—The totals for this species include all birds of the Willow Flycatcher/Alder Flycatcher (*Empidonax alnorum*) complex, including captured individuals thought from detailed examination possibly to be Alder Flycatchers. See comments under Alder Flycatcher in the hypothetical species section.

Say's Phoebe—An individual on 22 February 1984 was reclassified as an early spring migrant rather than a winter visitant. The next earliest spring migrant arrived on 1 March. A bird present 22–24 July 1988 was an anomalous summer arrival, the next earliest fall individual arriving on 1 September. Excluding the July record results in a mean fall arrival date of 24 September ± 12 days.

Tropical Kingbird—DeSante and Ainley (1980) reported two birds of this species in August 1973, one on the 7th and one from the 18th to 25th, which was collected on the latter date. Because this is an unprecedented time of year for this species to be in California and because two of the similar Western Kingbird were recorded between 8 and 17 August 1973, we here consider the two records of Tropical Kingbird to represent the same individual that was missed or confused with the Western Kingbirds. This anomalous August record excluded, the fall mean arrival date for the species was 21 October ± 16 days. The next earliest fall individual arrived on 1 October.

Tree Swallow—Two individuals each on 24 February 1978 and 24 February 1985 were reclassified as early spring migrants rather than winter visitants. The next earliest spring migrant arrived on 2 March.

Violet-green Swallow—A bird observed on 3 February 1976 was reclassified as an early spring migrant rather than a winter visitant; the next earliest spring record was for 1 March. The spring total includes at least two immature dispersants, which arrived on 24 June 1975 and 2 June 1989.

Northern Rough-winged Swallow—An individual on 9 March 1979 was exceptionally early, the next earliest spring arrival being on 28 April.

Rock Wren—DeSante and Ainley (1980) summarized the breeding status of this species on the island through 1975. From 1976 through 1989 it bred only twice, in 1979 and 1987, producing five and four fledglings, respectively. In both years all juveniles and the adults disappeared within three weeks of the young's fledging; we suspect that the young birds, at least, were caught and eaten by Western Gulls. One pair each also spent the summers of 1983 and 1988 on the island but did not attempt nesting. The arrival totals do not include fledglings although the spring high count of nine birds on 13 June 1971 does include five fledglings.

House Wren—The spring total includes at least two dispersing immatures, captured and banded on 20 June 1985 and 12 July 1972.

Dusky Warbler—See Pyle et al. (1983) for more information on the first of the two occurrences, on 27 September 1980.

Golden-crowned Kinglet—An arrival on 27 June 1978 was very late, the next latest spring record being for 27 May.

Townsend's Solitaire—The high count was of three birds on 27 January 1984.

American Robin—Individuals occurring on 21 July 1980, 25 July 1973, and 31 July 1980 were anomalous summer arrivals, the next earliest fall arrival being 19 September. Excluding the July birds, the fall mean arrival date was 15 November ± 23 days.

White/Black-backed Wagtail—Morlan (1981) evaluated a photograph of the one arrival, an immature bird, and concluded that it could not be identified as either a White or a Black-backed wagtail.

Red-throated Pipit—A pipit possibly of this species, recorded on 21 October 1979, is excluded from the table as it was not accepted by the CBRC (D. Roberson pers. comm.).

American Pipit—An individual recorded on 3 July 1974 represents an anomalous summer arrival; the next latest spring occurrence was on 12 May. Excluding the July arrival, the spring mean arrival date was 25 April ± 14 days.

European Starling—DeSante and Ainley (1980) summarized the breeding status of this species on the island through 1975. Starlings continued to nest each year through 1982 but did not nest again through 1989. Twelve pairs produced approximately 28 fledglings from 1976 through 1982, with a peak of 8–10 fledglings produced by two or three pairs in 1980. Pairs often nested twice during a season, fledging most young in May and July. The arrival totals do not include the fledglings.

Hutton's Vireo—We chose to reclassify an arrival on 23 February 1985 as an early spring migrant rather than a winter visitor, although the next earliest spring migrant did not occur until 29 March. If it is considered a winter bird, the spring mean arrival date was 26 April ± 17 days.

Philadelphia Vireo—A record for 21 September 1978 was not accepted by the CBRC and is excluded from Table 1.

Tennessee Warbler—Birds arriving on 15 July 1980 and 17 July 1976 were considered late spring migrants rather than fall arrivals. The next latest spring individual arrived on 7 July.

Orange-crowned Warbler—Five arrivals between 19 and 26 February, and a sixth on 23 December 1977, we reclassified from winter visitants to early spring and late fall migrants, respectively. The next earliest spring migrant arrived on 9 March and the next latest fall migrant arrived on 13 December. The spring totals include at least six dispersing immatures, recorded between 6 June and 3 July.

Chestnut-sided Warbler—An early spring migrant arrived on 1 May 1975. The next earliest individual arrived on 26 May.

Yellow-rumped Warbler—A Myrtle Warbler present on the island from 15 July to 10 August 1971 has been reclassified as a late spring migrant; the next latest spring arrival was 13 July. Audubon's Warblers arriving 15 July 1973, 16 July 1973 (2 birds), 28 July 1988, and 13 August 1987 were anomalous summer visitants; excluding these the mean fall arrival date was 20 October ± 18 days for Yellow-rumped Warbler and 15 October ± 18 days for Audubon's Warbler. The next earliest fall Audubon's Warbler arrived 6 September.

Hermit Warbler—A late fall individual arrived on 20 November 1968; the next latest record was for 24 October.

Yellow-throated Warbler—All five birds were of the white-lored race, *Dendroica dominica albilora*.

Blackpoll Warbler—Molting adults present 22–25 July 1982, 1–16 August 1969, and 8–12 August 1973 were anomalous summer arrivals; excluding these the

mean fall arrival date was 23 September ± 12 days. The next earliest fall record was 28 August.

Ovenbird—Three arrivals from 15 to 21 July have been reclassified as late spring rather than early fall migrants. The next latest spring bird arrived on 11 July.

Kentucky Warbler—Birds recorded on 2 June 1969 and 18 June 1976 have not been submitted to the CBRC and are thus excluded from the table. If these are included the mean spring arrival date was 10 June ± 21 days.

Mourning Warbler—An immature bird on 8 September 1984 showed characteristics of both this species and MacGillivray's Warbler (see Pyle and Henderson 1990). Although the bird was possibly a Mourning Warbler, the CBRC did not accept the record as such (D. Roberson pers. comm.) and it is not included in the table.

Wilson's Warbler—An immature banded on 13 July 1986 has been classified as an early fall rather than a late spring migrant. The next earliest fall migrant arrived on 21 July.

Western Tanager—An arrival on 25 November 1982 was late, the next latest fall individual occurring on 2 November.

Rose-breasted × *Black-headed Grosbeak*—All four records were of males; an equal number of females might be expected, and may have gone undetected owing to the difficulty in distinguishing these from females of either parental species.

Black-headed Grosbeak—The spring totals include at least one immature dispersant, captured on 4 July 1968. A late migrant arrived on 20 November 1978; the next latest fall arrival date was 26 October.

Rufous-sided Towhee—All birds have been of the western *P. e. maculatus* subspecies group, the Spotted Towhee. An individual recorded on 23 February 1985 has been reclassified as an early spring migrant rather than a winter visitor, although the next earliest spring migrant did not arrive until 21 March. If it is included as a winter bird, the mean spring arrival date was 15 April ± 16 days. An arrival on 1 June 1980 was late, the next latest being on 7 May.

Savannah Sparrow—An arrival on 23 December 1976 has been reclassified as a late fall migrant rather than a winter arrival; the next latest fall migrant arrived on 17 December.

Song Sparrow—An individual recorded on 28 February 1987 is considered an early spring migrant rather than a winter visitant, although the next earliest spring individual did not occur until 26 March. If this individual is considered a winter arrival the spring mean arrival date was 28 April ± 24 days. An arrival on 26 June 1981 was late, the next latest being on 18 May.

Lincoln's Sparrow—Individuals arriving on 28 February 1984 and 28 February 1985 have been classified as early spring migrants rather than winter visitors; the next earliest spring birds occurred on 1 March.

Oregon Junco—The Pink-sided Junco (*Junco hyemalis mearnsi*) occurs uncommonly (up to five records per year) during the fall. Because this race is often difficult to distinguish in the field from other Oregon Juncos we have combined these forms in Table 1. The spring total includes at least eight immature dispersants observed between 9 June and 6 July.

Chestnut-collared Longspur—A male in breeding plumage that occurred on 16 July 1984 has been reclassified as an anomalous spring arrival rather than a fall migrant; the next latest spring bird arrived on 26 June.

Snow Bunting—An individual recorded on 24 October 1981 has not been submitted to the CBRC and is thus not incorporated into Table 1. If the record is added to the analysis, mean arrival date was 2 November ± 10 days.

Western Meadowlark—The totals include all meadowlarks recorded with the exception of one present on the island 27-30 October 1985, which was possibly an Eastern Meadowlark (*Sturnella magna*). The record is currently being evaluated by the CBRC; here we consider it an unidentified individual.

Hooded Oriole—A late individual arrived on 19 November 1981, the next latest fall record being for 13 October.

Northern Oriole—An immature Bullock's Oriole captured on 3 July 1972 has been reclassified from a spring dispersant to an early fall migrant; the next earliest fall record was for 15 July. A late Baltimore Oriole occurred on 30 November 1969; the next latest fall arrival was on 27 October.

Red Crossbill—An anomalously early fall individual arrived on 9 August 1977; the next earliest fall record was for 20 October. Excluding the August record, the fall mean arrival date was 2 November ± 5 days.

Lesser Goldfinch—A bird on 28 February 1987 has been classified as an early spring migrant rather than a winter visitant; the next earliest spring migrant arrived on 9 March.

House Sparrow—DeSante and Ainley (1980) summarized the breeding status of this species on the island through 1975. No additional breeding was attempted through 1987; prospecting birds arriving from March to June departed the island, apparently owing to the lack of suitable nesting sites. In the fall of 1987 the roofs of the living quarters were replaced, creating cavities that were used by nesting House Sparrows in 1988 and 1989. In each of these years, two males and a female raised two broods of three young each, which fledged in May and August. In both years the adults and young, which were all banded, departed the island during the fall; the adults in 1989 were different individuals from those in 1988. The arrival totals do not include the fledged young although the fall high count of seven birds in August 1989 includes five fledglings.

HYPOTHETICAL SPECIES AND CAGEBIRDS

Cook's Petrel (*Pterodroma cookii*)—A bird observed from the island on 21 September 1970 and reported as this species was not accepted by the CBRC (Winter 1973) and is here considered hypothetical. Unidentified, light-bodied *Pterodroma* petrels were also seen from the island on 13 January 1980 and 20 May 1988.

Wood Sandpiper (*Tringa glareola*)—A bird identified as this species was seen well, but in flight only, on 20 August 1985. Because it was seen briefly and would represent a first California record, it was not accepted by the CBRC (Dunn 1988).

Rufous-necked Stint (*Calidris ruficollis*)—A juvenile sandpiper well seen and photographed on 15 and 16 August 1987 was likely this species. It is currently being evaluated by the CBRC; we consider the record hypothetical at this time.

Ringed Turtle-Dove (*Streptopelia risoria*)—An individual arrived on 15 October 1983, was captured and banded, and remained until the next day. We consider it to have been an escaped cagebird.

Black-headed Parakeet or Nanday Conure (*Nandayus nenday*)—One arrived on 29 September 1980.

Alder Flycatcher (*Empidonax alnorum*)—Four birds of the Willow/Alder flycatcher complex observed on the island were identified as possible Alder Flycatchers; their dates of occurrence were 4 September 1985, 2 September 1987 (specimen to

California Academy of Sciences, accession 4037), and 27 August 1988 (2 birds). All four birds were caught and carefully measured, they differed from other individuals of this complex captured on the island in having greener upperparts and wing formulae suggesting the Alder Flycatcher (Stein 1963). Unfortunately, none of these individuals was heard vocalizing while on the island. The bird of 4 September 1985 was considered unidentifiable by the CBRC (Langham, in press), while documentation of the latter three has not been submitted. All four are included in the table under Willow Flycatcher; see notes on that species.

Thick-billed Kingbird (*Tyrannus crassirostris*)—A bird seen on 14 September 1975, and reported by DeSante and Ainley (1980) as an unidentified kingbird, may have been this species. It was not accepted as such by the CBRC (D. Roberson pers. comm.), however, and is here regarded as hypothetical.

Cutthroat Weaver (*Amadina fasciata*)—One arriving on 25 September 1988 was captured and photographed.

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VAUX'S SWIFT NESTS IN HOLLOW TREES

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The Vaux's Swift (*Chaetura vauxi*) is a little known and uncommon bird in northeastern Oregon. These migratory birds arrive there in early May and leave in September (Gabrielson and Jewett 1970) and are often seen in forests or towns during migration. Nests of this species most often have been reported to be in chimneys (Finley and Finley 1924, Davis 1937, Bent 1940, Griffee 1961, Baldwin and Hunter 1963, Thompson 1977), probably because such nests are more conspicuous and more easily located than those in hollow trees. Only four Vaux's Swift nests in natural conditions in hollow trees have been reported in the literature (Taylor 1905, Baldwin and Zaczkowski 1963). Baldwin and Zaczkowski (1963) located three nests in hollow live Western Hemlocks (*Tsuga heterophylla*) with broken tops in Glacier National Park. Manuwal and Huff (1987) found Vaux's Swifts in spring associated most strongly with old-growth stands in Douglas-fir (*Pseudotsuga menziesii*) forests of the Washington Cascade Range.

Virtually nothing is known of how Vaux's Swifts use forests. The purpose of this study was to identify Vaux's Swift habitat used for nesting and to study some aspects of the species' breeding biology in northeastern Oregon forests (Baker, Umatilla, and Union counties).

METHODS

In May and June 1990, we noticed large numbers of Vaux's Swifts circling eight forested stands used by radio-tagged Pileated Woodpeckers (*Dyrocopus pileatus*) that we were following. All eight stands consisted of old-growth Grand Fir (*Abies grandis*) and contained hollow trees used by Pileated Woodpeckers for roosting at night. The woodpeckers had excavated one or more holes in such trees to reach the hollow interiors. The old-growth stands had a dominant overstory of trees >50 cm dbh (diameter at breast height), at least two canopy layers (canopy closure >50%), and standing dead trees.

To locate nests, we watched 74 potential nest trees in July for 10–15 minutes each in five of the eight stands. We considered a tree a potential nest site if it had a hollow interior and a Pileated Woodpecker entrance hole or a broken-off top.

If a swift was seen entering a tree, we climbed the tree to determine if there was a nest. We used a periscope to look for nests in trees with intact tops. If we could see a nest, we recorded the number and size of young and the distance from the entrance hole to the nest. We measured diameter, depth, and height of the hollow chamber (both up and down) from the entrance hole, as well as the height, width, and exposure of the entrance hole, the outside tree diameter at the entrance hole, and the thickness of the shell at the entrance. For the nest tree, species, condition (live or dead),

dbh, tree height, height of entrance hole above ground, number of entrance holes, presence of decay, and condition of the tree top (intact or broken) also were recorded.

In the 1 hectare surrounding the tree, we recorded forest type, successional stage, logging activity, canopy closure, and slope gradient and exposure. Successional stage was classified as mature or old growth. Old-growth stands were multi-layered, had >50% canopy closure, and had >10 trees/ha that were >50 cm dbh. Stands that contained trees >30 cm dbh but did not have any trees >50 cm dbh or did not have enough to qualify as old growth were considered mature. Logging activity was classified as (1) no logging or high-graded stands logged >20 yrs ago when only the valuable large-diameter seral species Ponderosa Pine (*Pinus ponderosa*), Western Larch (*Larix occidentalis*), and Douglas-fir were harvested, (2) partial overstory removal where 20–40% of the basal area had been removed within the last 20 years, or (3) shelterwood cut, which is the gradual removal of an entire stand in a series of cuts. Canopy closure was determined in percentage with a densiometer. Slope gradient was measured in percentage with a clinometer.

We recorded feeding interval by sitting below nest trees and recording the time an adult entered and left the entrance hole during the day.

RESULTS

Twenty-one Vaux's Swift nests were located in 20 trees; one tree contained two nests. All the nests were in trees with their heartwood cores decayed and hollowed out by Indian paint fungus (*Echinodontium tinctorium*), and all had entrance holes excavated by Pileated Woodpeckers for roosts (Figure 1).

We located the first nest on 20 June when we saw a swift breaking tiny branches off a small (15 cm dbh) dead Douglas-fir and flying into a hole excavated by a Pileated Woodpecker in a large (94 cm dbh) dead Grand Fir. The second nest was located 12 July and contained 6 or 7 eggs; on 17 July this nest contained 5 or 6 young. The nest was a semicircle of small sticks cemented together with saliva (Figure 2). The other 19 nests were located between 20 July and 2 August, and all contained young. Young swifts were observed out of the nest but clinging to the wall of the nest cavity at three nests on 1, 2, and 6 August. Adults were still entering one of the nest trees on 20 August.

We observed Vaux's Swifts apparently copulating in the air on 11 June 200 m from a nest. On 27 June we observed one of a pair of Vaux's Swift in the V-glide aerial display described by Stokes (1983) as part of the courtship of the Chimney Swift (*Chaetura pelagica*). This behavior has not been previously reported for the Vaux's Swift.

To record foraging intervals, we watched seven nests from 20 July to 3 August for a total of 7.2 hours. The average interval between trips to feed young at a nest was 12.1 minutes (SD = 16.61, range = 0.5–90 minutes, N = 27). The amount of time the adult stayed in the nest averaged 178 seconds (SD = 340.47, range = 30–1800 sec, N = 28).

All the swifts entered their nest trees through the woodpecker holes. Three of the 20 nest trees had their tops broken off, and we observed swifts

Figure 1. Live Grand Fir with Pileated Woodpecker holes used by Vaux's Swifts as a nest tree.

Photo by Evelyn L. Bull

leave the tree through the hollow top at two of them. We never saw them enter the trees through the top.

Nineteen of the holes excavated by Pileated Woodpeckers and used by the swifts were full-sized (approximately 11 × 8 cm, Table 1), while two of

Figure 2. Vaux's Swift nest constructed on the inside of a hollow tree.

Photo by Evelyn L. Bull

them were only partially completed. One of the incomplete holes must have been about the minimum size (5.1 × 4.4 cm) the swifts could use, because we saw an adult swift get stuck in the hole on its way out. After about 2 minutes of struggling, it got a wing out of the hole, then the second, and used the wings as leverage to pull the rest of the body through. This happened only once in seven observed feedings at this nest.

Sixty-five percent of the swifts' nest chambers were accessible through one hole made by a Pileated Woodpecker; the remainder were accessible through two. Typically the swifts went into the lower of the two holes. Forty-three percent of the holes faced north, 34% faced east, 14% faced south, and 10% faced west.

Nineteen of the nests were an average of 2.05 m below the entrance hole used for access and 1.6 m up from the bottom of the chamber. Two nests were 0.4 and 2.5 m above the entrance hole. The tree containing the two swift nests had a partition separating them, so each pair had its own entrance and its own chamber. The pair in the lower hole had their nest below the entrance hole, whereas the pair in the upper hole had their nest above the hole.

All of the nests were in Grand Firs, of which 17 were live and 3 were dead. Trees used by the swifts for nesting were large in diameter (mean = 67 cm dbh). The entrance hole averaged 12 m above the ground and ranged in height from 8 to 18.3 m (Table 1).

The forest type surrounding all nest trees was Grand Fir. Seventeen of the nests were in old-growth stands that had no cutting or had been high-graded, two were in mature stands that had been high-graded, and one was in a shelterwood cut where large-diameter (>80 cm dbh) dead Grand Fir had been retained. Seventy-five percent of the nests were on slopes gentler

Table 1 Characteristics of 21 Vaux's Swift Nests in Hollow Trees in Northeastern Oregon, 1990

Characteristic	Mean	Standard Deviation	Range
Tree characteristics			
Diameter at breast height (cm)	67.5	14.6	45–96
Height (m)	25.4	6.7	15–37
Canopy closure (%)	70.8	18.7	5–91
Height of hole above ground (m)	12.0	2.6	8–18
Cavity characteristics			
Entrance hole height (cm)	10.9	2.0	5.1–12.7
Entrance hole width (cm)	8.1	1.2	9.8–4.4
Diameter inside cavity (cm)	28.4	5.1	19.7–39.1
Outside diameter at hole (cm)	48.8	10.2	32–66
Width of surrounding wood (cm)	7.8	2.9	3.2–13.7
Cavity depth below hole (m)	3.6	2.5	0.6–7.7
Cavity depth above hole (m)	2.1	1.7	0.1–7.6

than 10%; the remainder were on steeper slopes. Slope aspect was north-facing or east-facing at 80% of the nests.

Several nests were in close proximity in three of the stands. Eight nests were found within 2 ha in an old-growth stand in Umatilla County; the distance between these nests ranged from 30 to 94 m. Four nests were within 8 ha in an old-growth stand in Union County; distance between these nests ranged from 200 to 350 m. Another four nests were situated 70–400 m apart in another stand in Union County. The last four nests were all in separate stands. We doubt that we located all the Vaux's Swift nests in any of these stands.

DISCUSSION

In northeastern Oregon, the chronology of the Vaux's Swift nesting appeared to be nest building and incubation in June, nestlings from mid-July to mid-August, and fledglings (out of nest but in tree) from early to late August. These dates compare with other nesting dates reported in the literature for Oregon (Griffee 1961, Thompson 1977) and Montana (Baldwin and Hunter 1963, Baldwin and Zaczkowski 1963).

Davis (1937) reported feeding trips to the nest every 1–21 minutes; Finley and Finley (1924) observed feeding every 15–20 minutes at a nest. Our average foraging interval fell within these times; however, we observed a wider range of intervals than reported previously. The longest foraging interval (90 minutes) was recorded on a very hot afternoon. Both adults fed the young and remained in the cavity for 30 minutes or more.

Vaux's Swift nests were in old-growth Grand Fir and in trees used by Pileated Woodpeckers for roosting. Eighty-five percent of the nests were in old growth, and all nests were in Pileated Woodpecker roosts. We do not know if the association resulted because the potential nest sites were in old growth or because the swifts selected the old-growth habitat and then searched for nest sites there. Pileated Woodpeckers typically roost in old-growth Grand Fir because the large diameter of these trees accomodates a hollow chamber large enough for the woodpeckers to enter, 8–18 meters above the ground. In addition, the larger and older trees typically have more decay, which creates the hollow interior. In northeast Oregon, the majority of hollow trees are Grand Fir because of the prevalence of the Indian paint fungus that decays the heartwood.

The swifts cannot enter these hollow trees unless the top is broken off or there is a hole in them. For this reason, we suspect Pileated Woodpeckers create the majority of nest sites for Vaux's Swifts, because broken-topped hollow trees are scarce in most stands. Broken-topped trees are, however, important communal roost sites for Vaux's Swifts (Bull, unpublished data). Hofslund (1958) reported a Chimney Swift nest in an abandoned nesting hole of a Pileated Woodpecker.

In northeastern Oregon, it appears that Vaux's Swifts depend on Pileated Woodpeckers to provide access to suitable nest sites, and Pileated Woodpeckers, in turn, depend on old-growth forests to provide large-diameter trees with hollow interiors for their roost sites. These important habitat components need to be considered in habitat management decisions and to

be maintained in forests if nesting habitat for these birds is to be conserved. Our hypothesis that Vaux's Swifts require old-growth forests now needs testing to determine if the species is also found in second growth or logged stands with appropriate nest trees retained.

SUMMARY

Twenty-one Vaux's Swift nests were found in 20 hollow Grand Fir trees; one tree contained two nests. All 20 trees were Pileated Woodpecker roost trees, and the swifts entered these trees through holes created by the woodpeckers. Eighty-five percent of the nest trees were in old-growth forests. Nest building was observed in June; young were in the nest from mid-July to early August; young were out of the nest but in the tree from early to late August. Foraging interval at nests averaged 12 minutes. Eight nests were found within a 2-ha area.

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Accepted 6 March 1991

ATLASING CALIFORNIA'S BREEDING BIRDS—COUNTY BY COUNTY

TIM MANOLIS, 808 El Encino Way, Sacramento, California 95864

Projects to map the distributions of breeding bird species in a given area by means of a grid-based system have grown in popularity worldwide since the first of these breeding bird atlases (as they have come to be known) began in Great Britain in the 1960s (e. g., see Laughlin et al., Am. Birds 36:6, 1982).

In Europe and elsewhere atlas projects have often been national in scope. When atlasing hit North American shores, however, it fragmented into a state-by-state effort, and, as it made its way westward, into a county-by-county proposition.

The first California atlas project began in Marin County as early as 1976. Western Field Ornithologists' annual meeting has emerged since as a major forum for the discussion of atlasing efforts on the West Coast. At the 1985 meeting in San Rafael, David Shuford spoke about the Marin County atlas, one of only two (the other was Orange County's) then in progress within the state.

The first of what was to become a series of workshops on atlasing was held at the 1986 meeting in Sacramento. A conference room filled to overflowing with interested WFO members bore witness to a big upswing in atlas enthusiasm and activity. There were now three active California county atlas projects—Sonoma joined the list—and San Bernardino and Sacramento counties were preparing to start atlas work in 1987. Compilers of an atlas for Lane County, Oregon, presented a report on the status of their project.

By 1988, when a second atlas workshop was held at the WFO meeting in Monterey, eight California atlas projects were underway (Monterey, Santa Clara, and Santa Cruz were new additions).

At the most recent WFO meeting, in San Diego in September 1990, representatives of most of California's ongoing county atlas projects gathered for a third biennial workshop. Including Orange and Marin counties, which had completed field work, there were now 11 active county atlas projects (Napa, San Luis Obispo, and Riverside having been added to the list).

Six individuals representing seven atlas projects spoke at the San Diego meeting. Barbara Carlson (San Bernardino and Riverside counties) discussed some of the problems encountered in beginning an atlas project (e. g., raising funds, producing a project newsletter on a regular basis, developing database and mapping programs) but focused on encouraging atlasers to expand into neighboring counties, as her team of San Bernardino atlasers did in 1990 with the addition of Riverside County to the project. She pointed out that taking on a new county in this fashion, as an offshoot of an established project, was considerably easier than starting from the ground up.

Sylvia Ranney Gallagher (Orange County) shared experiences from her group's six years of field work. Among key points she mentioned were (1) the need to encourage community involvement in the project, using media coverage, (2) establishing a database management system before beginning the project, (3) collecting data on habitat distribution and changes during the course of the project, and (4) anticipating the final product (the published atlas) when formatting data collection.

Speaking next, I noted the current status of the Sacramento County project and described a graphical method for presenting information on breeding phenology collected during atlas work.

Paul Noble (Santa Clara County) presented maps of the preliminary distributions of certain species documented by Santa Clara County atlasers. He discussed aspects of atlasing in a county that contains rugged and isolated as well as heavily urbanized blocks.

Speaking for Santa Cruz County, David Suddjian discussed the status of the county's project, presenting data on patterns of distribution of some breeding species and describing the involvement of local organizations and some methods of fund-raising in support of atlas work. Suddjian also discussed the collection and graphical representation of data on breeding phenology.

Mildred Comar (San Luis Obispo County) concluded the county reports with a brief overview of progress on her county's project.

The workshop ended with an open discussion involving all participants. By consensus, those present encouraged WFO to establish a committee to evaluate the potential for further statewide cooperation and coordination of atlas work in California.

The day following, I presented a summary of the workshop to the WFO general membership, describing the current status of each project, discussing the value of these activities to the understanding and conservation of California's birdlife, and encouraging others to expand the work throughout the state. Some interest was expressed at the WFO meeting on establishing atlas projects in other counties, and I hope such interest will bear fruit and continue to spread.

With the exception of Marin, which was atlased by means of a grid of blocks approximately 2.5 km on a side (derived from directly subdividing USGS 7.5-minute topo maps), California county atlas projects have all used blocks 5 km on a side derived from the Universal Transverse Mercator Grid. All grid blocks are being covered in most counties (Marin, Napa, Orange, Sacramento, San Mateo, Santa Clara, Santa Cruz, Solano, and Sonoma). Larger counties, however, have not found such a course feasible. The Monterey and San Luis Obispo projects are covering all blocks in accessible areas (priority blocks) and quads (each with one priority and three non-priority blocks) in more remote areas. The San Bernardino and Riverside projects are conducting stratified random sampling, selecting one block out of six in areas with diverse habitats and one block out of twelve in areas with essentially monotypic vegetation, as well as covering specialty blocks with unique biological features.

The present status of all California county atlas projects is described below, including names and addresses of individuals who can be contacted for further information. All involved are eager to help other atlas projects get started (and deserve thanks for providing information for this summary). In addition, I urge anyone interested in working with or providing advice or assistance to the WFO committee to evaluate possibilities for statewide coordination of atlas work to contact me at the address shown.

CALIFORNIA COUNTY ATLAS PROJECTS

MARIN—Field work was conducted from 1976 to 1982. Results are in the final phases of preparation for publication. Contact: David Shuford, Point Reyes Bird Observatory, 4990 Shoreline Highway, Stinson Beach, CA 94970.

MONTEREY—Completion of field work, begun in 1988, is anticipated in 1992. Contact: Becca Serdehely, 280 Hidden Valley Road, Watsonville, CA 95076.

NAPA—Field work began in 1988 (pilot year). Completion of field work is anticipated in 1993. Contact: Bill Grummer, 3801 N. St Helena Highway, Calistoga, CA 94515, or Mike Rippey, Rural Route 1, Box 694, Vallejo, CA 94589.

ORANGE—Field work was conducted from 1985 to 1990. Results are being prepared for eventual publication. Contact: Sylvia Ranney Gallagher, 21562 Kaneohe Lane, Huntington Beach, CA 92646.

RIVERSIDE—Field work began in 1990. Contact: Barbara Carlson, P. O. Box 55419, Riverside, CA 92517.

SACRAMENTO—Field work began in 1987 (pilot year); completion is expected by 1992. Contact: Tim Manolis, 808 El Encino Way, Sacramento, CA 95864.

SAN BERNARDINO—Completion of field work, begun in 1987, is anticipated in 1992. Contact: Barbara Carlson (see above).

SAN FRANCISCO—Scheduled to begin in 1991. Contact: Stephen F. Bailey, Dept. of Ornithology and Mammalogy, California Academy of Sciences, Golden Gate Park, San Francisco, CA 94118.

SAN LUIS OBISPO—Field work began in 1989; completion is anticipated in 1993. Contact: Mildred Comar, 5525 Cascabel, Atascadero, CA 93422.

SAN MATEO—Scheduled to begin in 1991, but incorporating information gathered for the Santa Cruz and Santa Clara projects dating back to 1987; the project will be completed in 1994. Contact: David Suddjian, 1136 Callas Lane #1, Capitola, CA 95010.

SANTA CLARA—Scheduled for completion in 1992, field work began with a pilot year in 1987. Contact: William Bousman, 321 Arlington Way, Menlo Park, CA 94025.

SANTA CRUZ—Begun in 1988 (but incorporating some data collected in 1987), the project is scheduled for completion in 1991. Contact: David Suddjian (see under San Mateo County).

SOLANO—Began in 1988 (pilot year), but put on hold until completion of field work in Napa County. Completion anticipated in 1998. Contact: Robin Leong, 336 Benson Avenue, Vallejo, CA 94590.

SONOMA—Field work was conducted from 1986 to 1990. Results are being prepared for publication. Contact: Betty Burridge, 1653 Arroyo Sierra, Santa Rosa, CA 95404, or Ruth Rudesill, P.O. Box 371, Kenwood, CA 95452.

AN UPDATE FROM THE CALIFORNIA BIRD RECORDS COMMITTEE

MICHAEL A. PATTEN, Secretary, P. O. Box 8612, Riverside, California 92515-8612

The California Bird Records Committee (CBRC) received 221 records in 1990. A similar number (213) of records was received in 1989, and this will probably be close to the annual average. The CBRC has reviewed about 2860 of the 3110 "published records" (as defined by Roberson, "News from the California Bird Records Committee," *W. Birds* 20:269–271, 1989) through May 1990, which represents a review percentage of close to 92%.

The twelfth report of the CBRC is now in press (next issue of *Western Birds*) and a draft of the thirteenth report has been completed. These reports will publish all Committee decisions for bird records received through 1988. A fourteenth report is also in preparation. It will cover all pre-1986 records for which documentation has been obtained and recently reviewed. A list of "unresolved" records will also be published soon, either separately or as an appendix to the fourteenth report. This publication will list all published records for which little or no documentation has been received by the CBRC.

Roberson (1989) reported that as of January 1990 the California state list stood at 572 species. The CBRC has since reviewed and accepted three additional species: Murphy's Petrel (*Pterodroma ultima*), Common Pochard (*Aythya ferina*), and Gray Wagtail (*Motacilla cinerea*). Also, the Introduced Birds Subcommittee submitted the Sierra Nevada population of White-tailed Ptarmigan (*Lagopus leucurus*) for review, and the species was formally accepted. Thus, the current (April 1991) state list stands at 576 species. A number of species that would represent first state records are currently under review: Solander's Petrel (*Pterodroma solandri*), Crested Caracara (*Polyborus plancus*), Band-tailed Gull (*Larus belcheri*), Iceland Gull (*L. glaucoides*), Swallow-tailed Gull (*Creagrus furcatus*), Oriental (Rufous) Turtle-Dove (*Streptopelia orientalis*), Green Kingfisher (*Chloroceryle americana*), Cave Swallow (*Hirundo fulva*), Red-flanked Bluetail (*Tarsiger cyanurus*), Eyebrowed Thrush (*Turdus obscurus*), Smith's Longspur (*Calcarius pictus*), Eastern Meadowlark (*Sturnella magna*), and Oriental Greenfinch (*Carduelis sinica*).

The current members of the CBRC are Stephen F. Bailey, Jon L. Dunn, Richard A. Erickson, Kimball L. Garrett, Matt T. Heindel, Paul E. Lehman, Michael J. Lippsmeyer, Guy McCaskie, Joseph Morlan, and Michael A. Patten. After serving five years as Secretary, Don Roberson retired in January 1991. All documentation and correspondence should now be sent to me at the above address.

The annual CBRC meeting was held on 12 January 1991 at the Los Angeles County Museum of Natural History. At this meeting, no changes were made to the bylaws or the Review List, last given by Roberson (1989). As in the past, copies of the CBRC bylaws and Review List can be obtained from the Secretary at no charge, but please include a self-addressed stamped envelope.

Volume 22, Number 2, 1991

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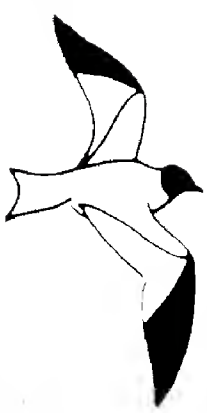
Cover photo by © David A. Leatherman of Fort Collins, Colorado: Least Bittern *(Ixobrychus exilis)*, Riverbend Ponds along Poudre River, Fort Collins, Colorado. June 1983.

Western Birds solicits papers that are both useful to and understandable by amateur field ornithologists and also contribute significantly to scientific literature. The journal welcomes contributions from both professionals and amateurs. Appropriate topics include distribution, migration, status, identification, geographic variation, conservation, behavior, ecology, population dynamics, habitat requirements, the effects of pollution, and techniques for censusing, sound recording, and photographing birds in the field. Papers of general interest will be considered regardless of their geographic origin, but particularly desired are reports of studies done in or bearing on the Rocky Mountain and Pacific states and provinces, including Alaska and Hawaii, western Texas, northwestern Mexico, and the northeastern Pacific Ocean.

Send manuscripts to Philip Unitt, 3411 Felton Street, San Diego, CA 92104. For matter of style consult the *Suggestions to Contributors to Western Birds* (8 pages available at no cost from the editor) and the *Council of Biology Editors Style Manual* (available for $24 from the Council of Biology Editors, Inc., 9650 Rockville Pike, Bethesda, MD 20814.

Reprints can be ordered at author's expense from the Editor when proof is returned or earlier.

Good photographs of rare and unusual birds, unaccompanied by an article but with caption including species, date, locality and other pertinent information, are wanted for publication in *Western Birds*. Submit photos and captions to Photo Editor.



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WESTERN BIRDS

Volume 22, Number 3, 1991

TWELFTH REPORT OF THE CALIFORNIA BIRD RECORDS COMMITTEE

JERI M. LANGHAM, Biology Department, California State University, Sacramento, California 95819

Western Field Ornithologists and the California Bird Records Committee are again pleased to thank Bushnell, a division of Bauch & Lomb, *for its continued generous support in helping to sponsor the publication of these reports.*

This report contains 244 reviewed records of 70 species plus one hybrid. The 206 accepted records of 58 species and 38 unaccepted records of 25 species plus one hybrid represent an 84.8% acceptance rate.

The California Bird Records Committee (hereafter, the CBRC or the Committee) is very grateful to the 183 observers who took time to contribute descriptions and/or photographs of birds on our Review List that they encountered in California. Although this report includes records from more observers than any previous report, we still encourage additional birders and ornithologists to support the CBRC process by submitting reports and/or photographs to Michael A. Patten, CBRC Secretary, P.O. Box 8612, Riverside, CA 92515. The Western Foundation of Vertebrate Zoology (1100 Glendon Avenue, Los Angeles, CA 90024) and its director Lloyd Kiff continue to maintain the archive of all records published in CBRC reports. All voice recordings are kept at the California Academy of Sciences, Department of Ornithology and Mammalogy, Golden Gate Park, San Francisco, CA 94118.

The Committee has accelerated its progress of reviewing older records while continuing to review current ones. The former include some specimen records as well as old records from the files of both the Middle and the Southern Pacific Coast regions of *American Birds* (hereafter abbreviated AB) and its predecessor *Audubon Field Notes* (hereafter AFN). Many of these reports have long been considered valid by other authors; their publication in this report marks their CBRC acceptance or unacceptance

under a formal record number. With the publication of our upcoming summary of old records in the fourteenth report, the CBRC will have evaluated about 91% of all published records of Review List species. We welcome all documentation of unreviewed past records, published or not.

State List. As of the eleventh report (Bevier 1990), the California list stood at 572. Since then, three additional species, the White-tailed Ptarmigan (*Lagopus leucurus*), Murphy's Petrel (*Pterodroma ultima*), and Gray Wagtail (*Motacilla cinerea*) have been accepted, bringing the list to 575. Details of these recent decisions will appear in the thirteenth and fourteenth reports. In addition, reported here is the earliest acceptable California record of the Anhinga (*Anhinga anhinga*).

The most recently published state checklist (Field List of California Birds, 1987) contains 565 species and is available from *Western Birds*' circulation manager for $1.00 postpaid.

Review List. The list of species and species complexes we review has remained fairly stable over recent years and was recently published by Roberson (1990). In general, our Review List includes species that average four or fewer records per year over the most recent 10-year period and any species not yet on the California list. The Tricolored Heron (*Egretta tricolor*) was recently added to this list (Bevier 1990), and documentation is desired only for observations since 1990. Cook's Petrel (*Pterodroma cookii*), Wilson's Storm-Petrel (*Oceanites oceanicus*), Barred Owl (*Strix varia*), and Prothonotary Warbler (*Protonotaria citrea*) were deleted (Bevier 1990), but we still desire documentation for records prior to 1990 of these four species.

Format. The format is very similar to that of the tenth (Dunn 1988) and eleventh (Bevier 1990) reports. The accepted and unaccepted records are listed separately by species in the order of the *Check-list of North American Birds*, 6th ed. (AOU 1983), and its supplements (AOU 1985, 1987, 1989). Within each species account, the records are usually listed chronologically according to first known date of occurrence. On rare occasions, to facilitate understanding of CBRC decisions, the order has been changed. Names preceded by an asterisk are of species no longer on the Review List. The number of CBRC-accepted records, in parentheses, follows the species name. For species we no longer review, this number reflects only CBRC-accepted records during the period in which the species was on our Review List. Two asterisks following this number denote that the period of years for which the species has been reviewed is restricted or that some older reports not formally accepted have been included (Roberson 1986). Each record includes the locality, a standard abbreviation for the county (see below), and full date spans. In most cases, the dates are from the seasonal reports in AB and AFN. Dates differing from those listed in these publications are italicized, indicating that ours are correct. Enclosed in parentheses are the initials of the reporting observer(s), listed in alphabetical sequence by last name and followed by the CBRC record number. If the observer(s) who initially found or identified the bird provided documentation, their initials are listed first, followed by a semicolon. If an observer submitted a photograph, a dagger follows the initials. Many photographers also submitted

written descriptions with their photos, a practice we strongly encourage. A specimen is indicated by an acronym (see below) for the museum that houses it and the specimen number (if available). Unless indicated by "†" or "#," all reports are sight records. When individual birds return for additional years, each annual occurrence is reviewed under a separate record number, and Committee members indicate if they believe the bird is the same individual as one previously accepted. If a majority agrees it is the same, it is treated as additional dates of a previous record and does not add to the number following this species' name. If a majority thinks it is different, it is considered a new individual. Individuals judged probably the same are considered the same individual, but those judged only possibly the same are considered new birds.

All annotations are mine, although the information usually is derived from the Committee's files. The CBRC does not review the sex or age of rarities. Such designations here are my opinions based on what I consider clear evidence. Likewise, the Committee generally does not assign rarities to any particular race. However, I include subspecific information on specimens where the identification was made by an ornithologist who examined a specimen or when other evidence was compelling.

Abbreviations. The Committee has adopted standard county abbreviations, with only the abbreviation for Monterey being changed (MNT to MTY) since the tenth report (Dunn 1988). California's counties are ALA, Alameda; ALP, Alpine; AMA, Amador; BUT, Butte; CLV, Calaveras; COL, Colusa; CC, Contra Costa; DN, Del Norte; ED, El Dorado; FRE, Fresno; GLE, Glenn; HUM, Humboldt; IMP, Imperial; INY, Inyo; KER, Kern; KIN, Kings; LAK, Lake; LAS, Lassen; LA, Los Angeles; MAD, Madera; MRN, Marin; MRP, Mariposa; MEN, Mendocino; MER, Merced; MOD, Modoc; MNO, Mono; MTY, Monterey; NAP, Napa; NEV, Nevada; ORA, Orange; PLA, Placer; PLU, Plumas; RIV, Riverside; SAC, Sacramento; SBT, San Benito; SBE, San Bernardino; SD, San Diego; SF, San Francisco; SJ, San Joaquin; SLO, San Luis Obispo; SM, San Mateo; SBA, Santa Barbara; SCL, Santa Clara; SCZ, Santa Cruz; SHA, Shasta; SIE, Sierra; SIS, Siskiyou; SOL, Solano; SON, Sonoma; STA, Stanislaus; SUT, Sutter; TEH, Tehama; TRI, Trinity; TUL, Tulare; TUO, Tuolumne; VEN, Ventura; YOL, Yolo; and YUB, Yuba. This report contains records received from 31 of the state's 58 counties.

Museums that house specimens reported herein, and have permitted CBRC members access to their specimens or are otherwise cited are abbreviated as follows: AMNH, American Museum of Natural History, New York; CAS, California Academy of Sciences, San Francisco; LACM, Los Angeles County Museum of Natural History; MVZ, Museum of Vertebrate Zoology, University of California, Berkeley; PGMNH, Pacific Grove Museum of Natural History; HSU, Humboldt State University, Arcata; SDNHM, San Diego Natural History Museum; and USNM, United States National Museum of Natural History, Washington, D.C.

Other abbreviations include NM, National Monument; NP, National Park; NS, National Seashore; and NWR, National Wildlife Refuge.

ACCEPTED RECORDS

YELLOW-BILLED LOON *Gavia adamsii* (36). One was at Crescent City harbor, DN, 28–30 Oct 1986 (GSL, LPL, JAR†; 1-1987). One was at Woodly Island marina, Eureka, HUM, 10-11 Mar 1987 (GSL, LPL; 126-1987). One was photographed about 4 miles out from Monterey harbor, MTY, 28 Mar 1987 (BA†, MPar†, DEQ; 151-1987).

Those submitting reports of this species should read Phillips (1990), who cautioned that only adults in alternate plumage are readily distinguishable from the more widespread Common Loon (*G. immer*). Since most of California's records are not in this plumage, see Binford and Remsen (1974), Burn and Mather (1974), Appleby et al. (1986), Godfrey (1986), and Kaufman (1990) for other important field marks.

SHORT-TAILED ALBATROSS *Diomedea albatrus* (4**). A first-year bird was seen during a seabird census 20 miles west of Cypress Point in outer Monterey Canyon, MTY, 18 Apr 1987 (DGA; 97-1987).

*WILSON'S STORM-PETREL *Oceanites oceanicus* (78). One was 13 miles west of the Eel River mouth, HUM, 6 Oct 1979 (RLeV; 324-1986). One was on Monterey Bay, MTY, 15 Oct–*13 Nov* 1983 (SFB; 222-1986). One was just beyond the Cordell Bank, MRN, 13 Jul 1986 (JM; SFB, RS; 291-1986). Up to two birds were seen on Monterey Bay, MTY, 31 Aug–*12 Nov* 1986 (RAE, JML, DLS; 387-1986).

The 6 Oct 1979 sighting becomes the northernmost accepted record for California, although there is a 31 May 1976 report from the south jetty of the Columbia River mouth in Oregon Schmidt (1989). The 13 Jul 1986 individual establishes the earliest accepted fall California record for this species, with the earliest previous accepted records falling in the last week of August. However, the CBRC is reviewing a report of 16 individuals seen 15 Aug 1987 just a few miles from the Cordell Bank location. California's only spring record is 1 May 1978, Monterey Bay (Roberson 1985, 1986).

RED-FOOTED BOOBY *Sula sula* (3). One adult (or close to it) was seen at Morro Rock, Morro Bay, SLO, 27 May 1985 (JSc; DT; Figure 1; 76-1985).

This record was almost rejected by the CBRC with a 1–9 vote on the first round and 2–8 vote on the second. Harrison's (1983) Red-footed Booby text and figure captions for wingspan are incorrect. Murphy's (1936) wingspan data of 147–150 cm for males and 146–158 cm for females are more reasonable. Harrison's error (pointed out by Bailey) had caused several members to reject on the first round because of the report's drawn wingspan comparison to Western Gulls (*Larus occidentalis*). It was Garrett, however, whose persistent positive comments from March 1986 until August 1988 eventually caused the 9–1 vote. The omission from the drawings of the diagnostic underwing black carpal patch was partially responsible for some original negative votes, but this mark was later pointed out by three members to be sometimes indistinct or difficult to see. The black and white tail pattern, which had also caused problems for several members, was shown to be possible in this species by LACM specimen #18948 and is not typical of other booby species.

While reports of very rare birds (in this case, two previously accepted records) should be scrutinized carefully by records committees, I believe this episode serves as an excellent example of how valuable committee interaction can be. Having ten members on a committee usually ensures that several will have field experience with most rarities, that one or more work for museums or have easy access to collections, that some have excellent libraries or access to university libraries, that in any given group of records several members will have time to research difficult reports closely,

and that at least one member will know or be able to learn about the person(s) submitting the report. One of the most useful functions of state records committees, not mentioned in Bevier's (1990) comments on Committee procedures, is to document the ability and integrity of our contemporaries for future researchers who may wish to evaluate the records themselves. Immaculate descriptions can easily be copied out of books by anyone, and we all know observers who are prone to report rarities that can seldom be refound for verification.

ANHINGA *Anhinga anhinga* (3). An adult male was at Lake Merced, SF, 2 Jun–16 Jul 1939 (not 2–29 Jun 1939 as in Grinnell and Miller 1944 and Roberson 1980) (GB; 2-1979). This record, submitted to the CBRC in 1978 by David DeSante, is based on Grinnell and Miller's (1944) references to Bolander's (1939) comments and brief description and to a comment in AFN (*Gull* 21:81) naming five observers who last saw the bird on 16 Jul 1939. The brief description by Bolander (1939) would probably not be accepted if submitted for a *modern* sighting, but the CBRC is usually more lenient with old records of easily identified species.

This record was originally rejected 2–8 (Binford 1985) at the end of its second round, primarily on the basis of questionable natural occurrence. Whether accepted or rejected, all records submitted to the CBRC are archived at the Western Foundation of Vertebrate Zoology in Los Angeles and can, by majority vote at any annual meeting, be recirculated again. Such was the case with this record, after two subsequent Anhinga records had been accepted from southern California (Roberson 1980, Bevier 1990). Some CBRC members prefer to wait for development of clear patterns of vagrancy between California and a bird's normal range before accepting first state records.

An Anhinga reported from Searsville Lake, SM, 28–30 May 1939, and cited in the *Gull* 21:70 as "undoubtedly" the same bird as seen on Lake Merced was not voted on by the Committee because no description accompanied the published report.

Figure 1. Three illustrations of the Red-footed Booby (*Sula sula*) with a Western Gull (*Larus occidentalis*) near Morro Rock, Morro Bay, San Luis Obispo County, California, 27 May 1986.

Sketch by John Schmitt

REDDISH EGRET *Egretta rufescens* (20). One immature was present at Seal Beach, ORA, 8 Nov 1980–*16 Jan* 1981 (SFB, HS†; 223-1986). This might possibly be the same as 9-1985 (Bevier 1990). A subadult was at the mouth of the Santa Margarita River, SD, 17 Apr–3 May 1981 (LSal; 23-1987). An adult at Gunpowder Point near the Sweetwater River mouth, Chula Vista, San Diego Bay, SD, 13 Oct 1986–*31 Jan* 1987 (BDP, GMcC; 437-1986), is the same individual (with a slightly deformed bill) returning here for its fifth winter (records 49-1984, 45-1984, Roberson 1986; 50-1985, Dunn 1988; and 69-1986, Bevier 1990). An immature was observed at the Tijuana River mouth, SD, 4 Sep 1986–*7 Mar* 1987 (JLD, GMcC; 441-1986).

Although the CBRC received descriptions to support only two Reddish Egrets in San Diego Bay in fall 1986, up to four were reported (AB 41:143). We encourage all observers to submit descriptions of Review List species seen in California.

YELLOW-CROWNED NIGHT-HERON *Nyctanassa violacea* (12). An adult was at Scripps Institute of Oceanography, La Jolla, SD, 9–25 Apr 1987 (GMcC; 186-1987).

This is considered to be the same bird originally found at nearby San Elijo Lagoon 25 Oct 1981 and irregularly present there and at La Jolla since that time (previously accepted 88-1981, Binford 1985; 81-1982 and 36-1983, Morlan 1985; 237-1984, Dunn 1988; and 18-1986, Bevier 1990). Roberson (1986) and Dunn (1988) mistakenly published the 1983 record as 37-1983.

TRUMPETER SWAN *Cygnus buccinator* (11). An adult with a green neck band was seen at Tule Lake NWR, SIS, 23 Dec 1984 (RE; 28-1985). Another adult without a neck band was present the same day at the opposite end of Tule Lake NWR, MOD (MRo; 196-1985). Two adults were at King Island in the San Joaquin River delta, SJ, 1 Feb 1986 (DGY; 340-1986). Two adults were seen in flight at Tule Lake NWR, SIS, 18 Jan 1987 (PR; 78-1987).

There appears to be some confusion in the birding community about the meaning of green neck collars on swans. In a letter to the CBRC in June 1986, Harold H. Burgess (president of the Trumpeter Swan Society) informed us that green collars indicate only that the swan was banded in the Pacific Flyway. Green collars with white markings have been placed on Trumpeter Swans as follows: 01AA-19AA at Malheur NWR, 01MA-58MA at Red Rock Lakes NWR, 01PA-13PA at Turnbull NWR, and, since 1983, 01-99 by the Wyoming Game and Fish Department. Humboldt State University has used green collars (series R001-25) for the Tundra Swan (*Cygnus columbianus*) and, therefore, both species have been fitted with green collars.

Burgess also mentioned that a thousand Trumpeter Swans are being found in Washington and Oregon where only a hundred were being found prior to surveys begun in 1983. He challenges us to find the hundred or so he believes to be in California each winter. The CBRC urges utmost caution to those accepting this challenge, since to date such numbers have not been documented here.

Records of swans identified largely or solely on calls, including the first two listed above, have caused difficulties in Committee review. Observers looking at any individual bird at the same time often perceive and describe colors differently, and it should come as no surprise that individually we hear and describe calls differently. One must also be aware of the range in calls of the Tundra Swan. Regardless, typical Trumpeter Swan calls are diagnostic (Banko 1960), and, if clearly heard by an observer with much experience with the Tundra Swan, should support a claimed identification. Observers should take care to express their concept of heard calls accurately and also attempt to use differences in the shape and size of bill and body to support their identification. See Jordan (1988) for ways to distinguish these two species.

The latter two records mentioned above passed (10–0) on the first round, owing mainly to excellent extended comparative descriptions in one case and to both call and size comparisons in the other.

EMPEROR GOOSE *Chen canagica* (39**). An immature was present at Tule Lake NWR, SIS, *1–28* Nov 1981 (RE†; 295-1986). An immature was south of the mouth of Tillas Slough in the Smith River estuary, DN, *9 Jan–19 Feb* 1982 (RAE; 209-1986). One adult was at Prince Island, north of Crescent City, DN, 25 Feb 1984 (RST; 79-1987).

At least eight Emperor Geese (many actually taken by hunters) were in Del Norte and Humboldt counties during the first week of January 1982(AB 36:326), with one remaining at the Smith River mouth through the end of February. The CBRC requests details from anyone who saw any of the other seven, for which we received no descriptions.

TUFTED DUCK *Aythya fuligula* (37). An adult male at Mallard Reservoir, north of Concord, CC, 27 Dec 1986–10 Jan 1987 (BRi; JG, JM; 48-1987), was the first for Contra Costa County. A female observed variously at Elk Glen Lake in Golden Gate Park and the nearby San Francisco Zoo, SF, 19 Dec 1986–20 Mar 1987 (ASH†, DM, DR, DLS, RS†; 22-1987 and PG; 80-1987), was considered to be the same as 161-1986 (Bevier 1990), returning for its second winter. An adult male at Garretson Point on the east side of San Leandro Bay, Oakland, ALA, 11–12 Jan 1987 (JM†; 49-1987), was possibly the same adult male seen at Lake Merritt, Oakland, ALA, 19 Mar–5 Apr 1987 (SEF, JML, PEL, MJL, BDP, DEQ; 92-1987). An adult male was observed on Richardson Bay, MRN, 19 Jan 1987 (DAH; GC;155-1987). A majority of the Committee believes this individual was different from the one that wintered here for six years from 1976 to 1982 (see Luther 1980, Binford 1985, and Morlan 1985) as four winters had passed without any reports. A detailed discussion of these records with corrections will appear in our fourteenth report. An adult male photographed on a pond near Grenada, SIS, 15 Feb–13 Apr 1987 (RE†; 260-1987), was first found in each of the previous two years on the same pond but the record was circulated and accepted under two different numbers (93-1985 and 294-1986, Dunn 1988).

As discussed by Dunn (1988), individual Tufted Ducks often return in successive years, but because they sometimes move around either in the same or successive years, it is quite difficult to determine the exact number of individuals involved. Although not reported here, records from Point Reyes NS have been particularly troublesome and will be dealt with in our fourteenth report. Careful details on tuft length and other morphological characters, as well as dates, can be very helpful to Committee members and should be submitted by all observers.

KING EIDER *Somateria spectabilis* (22). A female was at the south end of Crescent City harbor, Crescent City, DN, *21* Nov–21 Dec 1986 (ADB, RE, WEH†, GSL, LPL, GMcC, JAR†; 46-1987).

STELLER'S EIDER *Polysticta stelleri* (2). An immature male was at the south spit of Humboldt Bay, HUM, *19* Nov 1983 (DB†; 292-1986). This bird was shot by Todd Pearl, later identified by him, and given to a friend who had Mike Reynolds, an amateur taxidermist, prepare the specimen. Photos taken by Reynold's friend Don Brewer now constitute the documentation for this record, as the specimen is in private hands.

MISSISSIPPI KITE *Ictinia mississippiensis* (18). A first-summer bird was at Furnace Creek, Death Valley NM, INY, 28–30 May 1983 (CC; JAJ; 226-1986). An immature was found at Oasis, MNO, 30 Aug 1986 (GMcC; 378-1986). The latter is only the fourth fall record for California.

Clark and Wheeler (1987) and Dunne et al. (1988) discussed identification of kite species recorded north of Mexico. Although the Plumbeous Kite (*I. plumbea*) is unrecorded here, kites should be described well enough to eliminate this species.

ZONE-TAILED HAWK *Buteo albonotatus* (20). An immature flew over Lake Henshaw, SD, 25 Feb 1984 (BF; 71-1984). An adult was seen at Cuyamaca Rancho State Park, SD, 3 Sep 1984 (MRR; 260-1986). A pair at Hot Springs Mountain, SD, 6–12 Jul 1986 (GMcC; 332-1986) fledged one young from a nest in July (AB 40:1255). This same pair returned to their nesting area 13 Jun–7 Jul 1987 (GMcC; MJL, CM; 162-1987) and again had young in the nest in July (AB 41:1487). An adult on the Plano Trabuco, ORA, 28 Nov–7 Dec 1986 (JLD; 442-1986), was considered to be the same bird present there in winter 1985–86 (17-1986, Bevier 1990).

Before finally being accepted on a 9–1 vote, the Lake Henshaw bird was subjected to five rounds of voting and to discussion at the January 1988 CBRC annual meeting. Much of the problem dealt with elimination of the Harlan's Red-tailed Hawk (*B. jamaicensis harlani*) as well as dark morphs of three other *Buteo* species, the Rough-legged (*B. lagopus*), Swainson's (*B. swainsoni*), and Short-tailed (*B. brachyurus*) hawks. Had they been published earlier, Clark and Wheeler (1987) and Dunne et al. (1988) might have been useful. The description of the tail pattern created problems, until compared with the juvenile on Plate II in Meyer de Schauensee and Phelps (1978). The observed dihedral wing character, similar to that of Turkey Vulture (*Cathartes aura*), was the deciding factor in helping the record to be accepted, along with a recently discovered nesting site on nearby Hot Springs Mountain. The Lake Henshaw bird was published (AB 38:357) as an adult, but details support its being in immature plumage. The Cuyamaca Rancho bird was published (AB 39:102) as an immature, but details support adult plumage.

YELLOW RAIL *Coturnicops noveboracensis* (57). One adult at Alameda, San Leandro Bay, ALA, 12 Dec 1985 (DRi, MPe; 160-1986), represents the first northern California record since 1970. One was seen at Tomales Bay, MRN, 3 Dec 1986 (JE; 156-1987). An adult was found dead at the Salt River mouth, Eel River slough, HUM, 2 Jan 1987 (GSL†, HSU #1098; 89-1987).

The recent records for this very secretive species indicate that it may be present more often as a wintering species in coastal California marshes than previously thought. Birders going to these areas during very high tides in hopes of seeing Yellow and Black (*Laterallus jamaicensis*) rails should be aware that the presence of humans may make these small rails vulnerable to predation. Observers have seen Great Blue Herons (*Ardea herodias*), Great Egrets (*Casmerodius albus*), and Black-crowned Night-Herons (*Nycticorax nycticorax*) eat small rails that are forced out of their concealed areas by very high tides. It is possible that birders standing around marsh edges may sometimes discourage these rails from flying to safer shrubby edge-cover.

Before finally being accepted on its third round with a 9–1 vote, the Alameda bird created much interesting discussion concerning the dates by which Soras (*Porzana carolina*) have molted out of juvenal plumage. It appears, however, that most Soras have lost much or all of their Yellow Rail-like juvenal plumage by early December, and, therefore, misidentifying a juvenile Sora as a Yellow Rail after that time is much less likely than previously believed. CBRC members searching through four different museums were unable to find any Sora specimens collected after early November that still resembled Yellow Rails. One member, however, noted that Cramp et al. (1980) said first alternate plumage is gained Nov–Feb and thus some, even if few, Soras may be in juvenal plumage after December. The best field mark on a flying bird is the diagnostic rectangular white secondary wing patches.

PURPLE GALLINULE *Porphyrula martinica* (2). An immature (Figure 2) was at Lake Elizabeth, Fremont, ALA, 17–27 Oct 1986 (AH; HLC, JLD, RAE, HG, DGr, KeH, JML, PLat, MJL, CM, GMcC, JM, BDP, DRt, RSt; 388-1986). In a reclamation project, the Fremont City Park Department recently destroyed the habitat where this bird was found.

The Purple Gallinule is famous for extralimital vagrancy, having occurred in 42 of the contiguous 48 states (DeSante and Pyle 1986, Johnson 1989), five Canadian provinces (Godfrey 1986), South Africa (Urban et al. 1986), the British Isles, and continental Europe (Cramp et al. 1980). See Remsen and Parker (1990) for additional comments on gallinule vagrancy.

MONGOLIAN PLOVER *Charadrius mongolus* (2). An adult in alternate plumage was at the Santa Clara River mouth, VEN, 12–17 Jul 1986 (JSR; JLDt, SEF, MJL, VKt; 300-1986). This bird was probably the same as one present at this location in 1982 (74-1982, Morlan 1985) and 1983 (65-1983, Roberson 1986). Because there was only one previous state record, a majority of the Committee suspected that this bird was more likely missed in 1984 and 1985 rather than a different individual.

Figure 2. California's second recorded Purple Gallinule (*Porphyrula martinica*) at Lake Elizabeth, Fremont, Alameda County, 17–27 Oct 1986.

Photo by Peter La Tourrette

Figure 3. California's first Barred Owl (*Strix varia*) recorded east of the Coast Ranges at Tule Lake Northwest Reserve, Siskiyou County, 28 Nov 1986–21 Feb 1987.

Photo by John R. Silliman

Figure 4. Sprague's Pipit (*Anthus spragueii*) on Southeast Farallon Island, San Francisco County, California, 10–11 Oct 1986.

Photo by Oddvin Lund

We also suspect that a successful vagrant is likely to repeat its migration stops in succeeding years.

EURASIAN DOTTEREL *Charadrius morinellus* (2). A juvenile was at Point Reyes NS, MRN, 6–9 Sep 1986 (DAH, DDK; SFB†, JC†, JLD, AG†, HG, MBG, KeH, RAH†, JML, PLa†, MJL, GMcC, JM, BDP, DR†, JTr†; 365-1986).

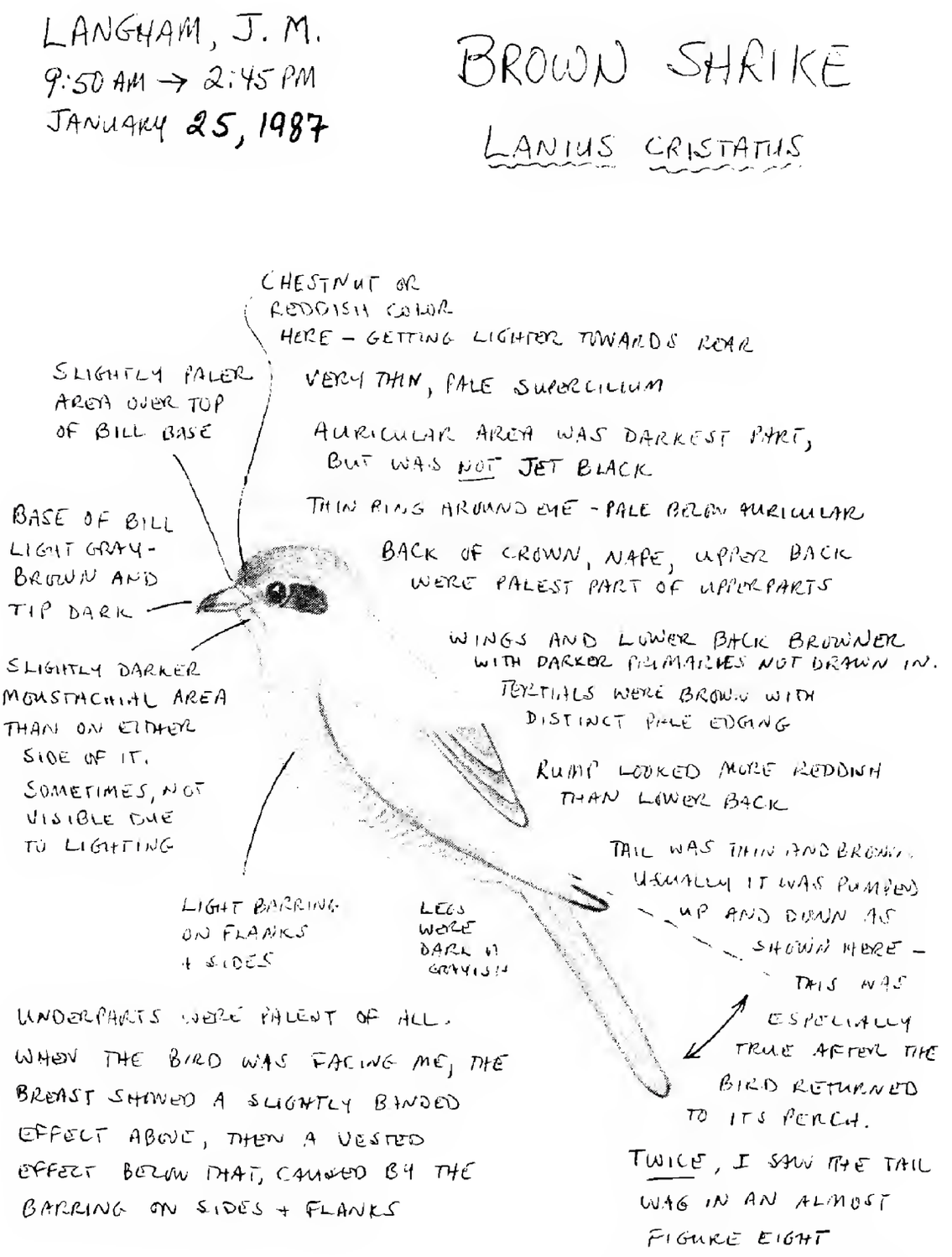
LANGHAM, J. M.
9:50 AM → 2:45 PM
JANUARY 25, 1987
BROWN SHRIKE
LANIUS CRISTATUS
CHESTNUT OR REDDISH COLOR HERE – GETTING LIGHTER TOWARDS REAR
SLIGHTLY PALER AREA OVER TOP OF BILL BASE
VERY THIN, PALE SUPERCILIUM
AURICULAR AREA WAS DARKEST PART, BUT WAS NOT JET BLACK
THIN RING AROUND EYE - PALE BROWN
AURICULAR
BACK OF CROWN, NAPE, UPPER BACK WERE PALEST PART OF UPPERPARTS
BASE OF BILL LIGHT GRAY-BROWN AND TIP DARK
WINGS AND LOWER BACK BROWNER WITH DARKER PRIMARIES NOT DRAWN IN.
TERTIALS WERE BROWN WITH DISTINCT PALE EDGING
SLIGHTLY DARKER MOUSTACHIAL AREA THAN ON EITHER SIDE OF IT. SOMETIMES, NOT VISIBLE DUE TO LIGHTING
RUMP LOOKED MORE REDDISH THAN LOWER BACK
TAIL WAS THIN AND BROWN. USUALLY IT WAS PUMPED UP AND DOWN AS SHOWN HERE – THIS WAS ESPECIALLY TRUE AFTER THE BIRD RETURNED TO ITS PERCH.
LIGHT BARRING ON FLANKS & SIDES
LEGS WERE DARK & GRAYISH
UNDERPARTS WERE PALEST OF ALL. WHEN THE BIRD WAS FACING ME, THE BREAST SHOWED A SLIGHTLY BANDED EFFECT ABOVE, THEN A VESTED EFFECT BELOW THAT, CAUSED BY THE BARRING ON SIDES & FLANKS
TWICE, I SAW THE TAIL WAG IN AN ALMOST FIGURE EIGHT

Figure 5. California's second recorded Brown Shrike (*Lanius cristatus*) at Whitehouse Pool near Point Reyes Station, Marin County, 28 Nov 1986–26 Apr 1987.

Sketch by Jeri M. Langham

This exceptionally well-documented record is the second for California, the state's first Eurasian Dotterel having been photographed on Southeast Farallon Island, SF, 12–20 Sep 1974 (Henderson 1979). Photographs of the Point Reyes bird were published in *Western Birds* 17:95, AB 41:42 and 139, and on the cover of *Birding* 18, no. 6. There are only two other west-coast records south of Alaska: Westport, Washington, 3 Sep 1934 (Brown 1935), and Ocean Shores, Washington, 8 Sep 1979 (Paulson 1979). All four of the above and one collected on Kure Atoll, Hawaiian Islands, 9 Sep 1964 (Clapp and Woodward 1968) occurred within the first two weeks of September and within the correct range of latitude for wintering of the Eurasian Dotterel (Cramp et al. 1983, Hayman et al. 1986, Urban et al. 1986). The species is considered rare but possibly a local summer breeder in Alaska (Kessel and Gibson 1978).

RUFOUS-NECKED STINT *Calidris ruficollis* (5). One in alternate plumage was found at Vigo Street marsh, Eureka, HUM, *20–22* Jul 1984 (KVR†, JSt; RLeV†; 430-1986).

WHITE-RUMPED SANDPIPER *Calidris fuscicollis* (9). One in alternate plumage was at Stockton sewage ponds, SJ, 17 May 1986 (DGY; KFH; 341-1986). This is the only Central Valley record and also the earliest for California.

BUFF-BREASTED SANDPIPER *Tryngites subruficollis* (42). One was at Año Nuevo State Reserve, SM, 1–4 Sep 1978 (EB; 197-1986). One was at Arcata marsh, HUM, 25 Aug–2 Sep 1979 (RLeV; 325-1986). Up to five birds were at Arcata bottoms, HUM, 15–25 Sep 1982 (RAE; 165-1986). Two birds were at Salinas sewage ponds, MTY, 28 Aug–2 Sep 1986 (SFB, JC, MaD†, MDa†, SEF,

Figure 6. Female Blue-winged Warbler (*Vermivora pinus*) at Butterbredt Springs, Kern County, California, 29–30 May 1987.

Photo by John Wilson

Figure 7. First Worm-eating Warbler (*Helmitheros vermivorus*) recorded in the Central Valley at Merced National Wildlife Refuge, Merced County, California, 31 Oct 1978.

Sketch by Robby J. Bacon

Figure 8. One Mourning Warbler (*Oporornis philadelphia*) and one Connecticut Warbler (*O. agilis*) on Southeast Farallon Island, San Francisco County, California, 12 Sep 1986.

Photo by Peter Pyle

PJM, MCM, JM, DR, DLS; 362-1986). One was at Asilomar State Beach, Pacific Grove, MTY, 6-8 Sep 1986 (DR, BT†; 364-1986). One was in the Tijuana River valley, SD, 11 Oct 1986 (PEL, GMcC; 466-1986).

As expected, all appeared to be juveniles. The 11 Oct individual was rather late.

LITTLE GULL *Larus minutus* (31). An adult was at Arcata oxidation ponds, HUM, 11–13 Nov 1982 (KVR†; 477-1986). An immature was at Arcata oxidation ponds, HUM, 31 Jul–14 Sep 1986 (RAE, LPL; 334-1986). An adult at Stockton sewage ponds, SJ, 16 Oct 1986 - 22 Apr 1987 (SW†; GMcC, DGY; 77-1987), is considered the same one here each winter since Mar 1979 (previously accepted as 21-1979, Luther et al. 1983; 85-1983, 93-1983, 1-1984, 42-1984, Roberson 1986; 269-1984, Dunn 1988; and 165-1985 Bevier 1990). A first-year bird was at the north end of the Salton Sea, RIV, 18 Apr–9 May 1987 (GMcC; PEL, MAP; 157-1987).

With the appearance of the Jul 1986 Arcata bird, there are now California records for every month of the year. According to David Yee (pers. comm.), the returning adult at Stockton sewage ponds (first reported 16 Oct 1986) was joined sometime in Mar 1987 by another adult that had been wintering at the Lodi sewage ponds since Dec 1986, and by a third adult from 1 to 13 Apr 1987. Two of the three were still present 17 Apr 1987, after which most Bonaparte's Gulls (*Larus philadelphia*) departed as well.

LESSER BLACK-BACKED GULL *Larus fuscus* (4). An adult was at the north end of the Salton Sea, RIV, 14 Sep–5 Oct 1986 (RH†; JLD†, GMcC, MAP; 379-1986). One was at Malibu Lagoon, LA, 19 Jan 1987 (TK†; 177-1987). The Salton Sea bird was only the third for California. The first was an adult photographed in Seaside, MTY, 14 Jan 1978 (Binford 1978), and the second was an adult at the south end of the Salton Sea, IMP, 18 Dec 1984–5 Jan 1985 (Dunn 1988). By an 8–1 vote (one abstention), the individual (379-1986) seen at the north end of the Salton Sea was considered to be probably different from the individual (278-1984 Dunn 1988) seen the previous year at the south end.

The Los Angeles County bird (177-1987) was the first for the southern California coast. Unfortunately, it was seen only by its finder, but excellent photographs taken that day clearly show a near-adult Lesser Black-backed Gull with some black smudging through the red mark on the mandible. Bevier (pers. comm.) saw an adult on the east coast that kept a black mark next to the red one on the lower mandible for as many as three years. In their voting comments, Dunn and Lehman mentioned an adult also possessing this dark smudge that returned for many winters to a beach north of Corpus Christi, Texas. Interestingly, Grant (1986) did not mention that adults can still show this mark after their fourth winter. Because of two additional records of this species at the Salton Sea (thirteenth report), the Malibu Lagoon individual actually represented California's sixth record.

SANDWICH TERN *Sterna sandvicensis* (1). An adult returned to the Elegant Tern (*S. elegans*) breeding colony in the saltworks at the south end of San Diego Bay, SD, 18 Apr–16 May 1987 (JML, GMcC; 137-1987). This is considered to be the same individual first seen here in May 1980 (Schaffner 1981 and previously accepted as 80-1980, Luther et al. 1983). It returned in 1982 (58-1982, Morlan 1985) and again in 1985 (9-1986, Bevier 1990) and is the only record for the west coast of North America north of Mexico.

BLACK-BILLED CUCKOO *Coccyzus erythropthalmus* (9). An immature was at Mono Lake County Park, MNO, 29 Aug 1986 (DS; 440-1986). An immature was at Big Sur River mouth, MTY, 2–4 Oct 1986 (DEG; SEF, MJL, CM, DR; 381-1986).

Zimmer (1985) pointed out that juvenile Yellow-billed Cuckoos (C. americanus) may lack the yellow lower mandible base and instead have a dusky mandible. Other

field marks that clearly separate the species should be noted. The Mono County bird represents the second accepted inland record for California, the first being one at Brock Ranch, IMP, 12–13 Sep 1981 (Binford 1985).

GROOVE-BILLED ANI *Crotophaga sulcirostris* (3). One was 2 miles north-northwest of Seeley, IMP, 25 Oct 1986 (PU; RH; 40-1987).

*BARRED OWL *Strix varia* (5). One heard along Horse Linto Road near Willow Creek, HUM, 16 Apr 1985 (JSt; 435-1986), is the same bird first discovered 30 Apr 1983 (48-1983, Morlan 1985) and now a resident here. One (Figure 3 and AB 41:325) found at Tule Lake NWR, SIS, 28 Nov 1986–21 Feb 1987 (RE†, RAE, JRS†, SS†; 85-1987), was the first found in California east of the Coast Ranges.

CHUCK-WILL'S-WIDOW *Caprimulgus carolinensis* (1). One found injured at Half Moon Bay, SM, 16 Oct 1986, was taken to the Peninsula Humane Society, where it subsequently died on 20 Oct 1986 (CAS #83955; 3-1987).

Full details with photographs were published by Bailey (1989).The only other record for the far West involved a specimen picked up on the road leading into Corn Springs on the Desert Wildlife Range of southwestern Nevada, 12 Jun 1984 (AB 38:1046).

BROAD-BILLED HUMMINGBIRD *Cynanthus latirostris* (28). One was at Año Nuevo State Reserve, SM, 19 Oct 1986 (MCM; 424-1986). This bird was published (AB 41:140) as an adult, but the five Committee members who commented on its age all agreed that the description indicated an immature male.

GREATER PEWEE *Contopus pertinax* (20). One was at Earp, SBE, 22 Dec 1983 (JSt; 90-1986). One at Montecito, SBA, 28 Dec 1985 (JEL; 189-1986), is considered to be the same bird present there the previous winter (265-1984, Dunn 1988).

Figure 9. Cassin's Sparrow (*Aimophila cassinii*) on Southeast Farallon Island, San Francisco County, California, 22 Sep 1986.

Photo by Peter Pyle

SCISSOR-TAILED FLYCATCHER *Tyrannus forficatus* (45). A male was near Clovis, FRE, 8 Jul 1978 (KFH; 320-1986). One was in the Tijuana River valley, SD, 27 Oct 1978 (JEM; 230-1986). One was at Tecopa, INY, 31 Aug–7 Sep 1981 (KS†; 299-1986). One was at Point Loma, SD, 1 Oct 1984 (REW; 243-1984). One was at the Mad River mouth, HUM, 30 Oct–1 Nov 1985 (JSt†; 391-1986). One on San Clemente Island, LA, 2 Jun 1986 (DW; 328-1986), is not previously published. One was at Goleta, SBA, 10 Jul 1986 (HPR; 467-986). One was photographed (AB 41:211) at Point Reyes NS, MRN, *30 Jan*–21 Feb 1987 (PEL, GMcC, JM†, BDP, RS†; 74-1987).

The Point Reyes NS bird is noteworthy in that there is only one other accepted California record for January and February (6 Jan–3 Feb 1980, Bevier 1990), one for February and April (22 Feb–early April, Bevier 1990), and none for December.

SEDGE WREN *Cistothorus platensis* (3). One was at Fort Funston, San Francisco, SF, 23–24 Oct 1986 (DDK; SFB†, JLD, DAH, JM; 443-1986). This represents only the third record for the state and is supported by excellent documentation, including the published (AB 41:140) photo.

GRAY-CHEEKED THRUSH *Catharus minimus* (9). One was on Southeast Farallon Island, SF, 26 Sep 1986 (PP; SH; 10-1987). One at Point Loma, SD, 1 Oct 1986 (REW; 38-1987), is the first record for southern California.

WOOD THRUSH *Hylocichla mustelina* (7). One found at Furnace Creek, Death Valley NM, INY, 15 Nov 1986 (GMcC; DRW†; 24-1987), established California's first inland record.

GRAY CATBIRD *Dumetella carolinensis* (32). One was at Deep Springs, INY, 6 Oct 1975 (PRS; 254-1986). Another was at Scotty's Castle, INY, 9 Sept 1981 (JSt;

Figure 10. Juvenile Le Conte's Sparrow (*Ammodramus leconteii*) on Southeast Farallon Island, San Francisco County, California, 11–12 Sep 1986.

Photo by Peter Pyle

428-1986). One was at Baker, SBE, 12–14 Oct 1984 (BED; JLD†; 298-1986). One was photographed at China Ranch near Tecopa, INY, 3–8 Oct 1986 (JTa†; 39-1987). One was at Point Loma, SD, 16–23 Oct 1986 (PEL, GMcC, BDP; 438-1986). One at Oasis, MNO, 24 May 1987 (PJM; 239-1987), was considered only possibly the same bird as a singing male there 30 May 1987 (CM; JML, MJL, GMcC; 147-1987). One was at Mojave, KER, 5 Jun 1987 (RSa†; JW†; 168-1987).

RED-THROATED PIPIT *Anthus cervinus* (41). One was at Prairie Creek Redwoods State Park, HUM, 10 Oct 1982 (GJS; 200-1986). One was heard but not visually singled out of the American Pipit (*A. rubescens*) flock flying overhead at Goleta, SBA, 6 Nov 1982 (PEL; 238-1986). One was photographed on Southeast Farallon Island, SF, 24–27 Sep 1986 (PP†; 55-1987). One was west of Santa Maria, SBA, 5–6 Oct 1986 (PEL; 469-1986). One bird at Point Reyes NS, MRN, 6 Oct, was joined by a second on 7 Oct with one still present until 11 Oct 1986 (DDK; RAE, DAH; 19-1987). One heard at Bolinas, MRN, 7 Oct 1986 (PP; 8-1987), and previously unpublished is considered only possibly the same as the second bird from record 19-1987. One was at Moss Landing, MTY, *12*–18 Oct 1986 (MDa; DR; 385-1987). Up to three birds were seen in the Tijuana River valley, SD, 14 Oct–2 Nov 1986 (PEL, GMcC; 470-1986), with three reported on 19 Oct and two still present 23 Oct. One was at Goleta, SBA, 14–15 Oct 1986 (JLD, PEL; 445-1986). Another one at Goleta, SBA, 4–15 Nov 1986 (PEL; JLD, CM; 444-1986), established California's latest record for this species.

SPRAGUE'S PIPIT *Anthus spragueii* (17). One (Figure 4) was on Southeast Farallon Island, SF, 10–11 Oct 1986 (KFH; OL†; 57-1987). Up to five were along Old River Road north of Needles, SBE, 2 Nov, with three still present *27* Nov 1986 (PEL, GMcC; 468-1986). One was seen and heard calling in flight over Brawley, IMP, 29 Nov 1986 (RH, GMcC; 25-1987).

Prior to the fall of 1974, Sprague's Pipit was unrecorded in California, but now it appears to be a rare fall vagrant and winter visitor, especially along the southeastern border of the state. The Brawley bird is the first for the Imperial Valley, although it should be expected there in the many alfalfa fields, as suggested by other southeastern California records.

BROWN SHRIKE *Lanius cristatus* (2). An immature (Figure 5) was at Whitehouse Pool near Point Reyes Station, MRN, 28 Nov 1986–26 April 1987 (MDe, MM†; LA, SFB, BBa, DC, JC†, JLD, AG†, CHK, THK, JML, PEL, TM, GMcC, CM, JM†, BDP, DR†, RS; 20-1987).

California's second Brown Shrike was found and identified by Oregonians Merrylynn Messinger (first to spot the bird) and Mike Denny while birding near Point Reyes Station. On the 29th,they had better looks and returned to Oregon on the 30th knowing it was a shrike but not which one. A positive identification was made 20 Dec 1986 when Mike checked Armstrong (1983). He then wrote to Peter Pyle and to the American Birding Association to inform them of the sighting, and both forwarded the information to the CBRC secretary. In the meantime, the bird was seen and misidentified by several observers as a Northern Shrike (*Lanius excubitor*) until Kevin Hintsa correctly identified it on 14 Jan 1987. Although we have written documentation from many birders and at least four good sketches, no close photos are included with the record. If anyone has good photos, please send them to the CBRC secretary for inclusion in a possible upcoming publication in *Western Birds* of details of this individual.

From the documentation and the excellent research work done by several current or former Committee members, all similar species have been adequately eliminated. Medway (1970), however, believed that immature Brown Shrikes are not identifiable to race even in the hand; the Point Reyes bird was described only before it molted into adult plumage, and so the Committee did not feel it could be assigned to a

specific race, although several members believed it to be of the nominate race (*L. c. cristatus*). The brief description of the adult-plumaged bird (AB 41:325) as having a bright rufous crown and a relatively indistinct supercilium and some distant photos added to the record after circulation suggest the nominate race, discussed by Dean (1982).

WHITE-EYED VIREO *Vireo griseus* (12). One at Deep Springs, INY, 21 May 1987 (CDB; PEL; 131-1987) is the first for Inyo County.

YELLOW-THROATED VIREO *Vireo flavifrons* (25). One was at Elk Head,Trinidad State Beach, HUM, 28 Apr 1983 (GSL; SWH; 421-1986). One was at Huntington Beach, ORA, 23 Oct–1 Nov 1986 (DRW; SFB†, JLD†, RAE, PEL, CM, GMcC; 446-1986). One was at Goleta, SBA, 30 Apr 1987 (CDB; JLD, PEL; 130-1987).

PHILADELPHIA VIREO *Vireo philadelphicus* (58). One was in the Tijuana River valley, SD, 12–14 Oct 1979 (CGE; GMcC; 370-1986). One was banded and photographed on Southeast Farallon Island, SF, 26 Sep 1983 (KFH†, PP; 319-1986). One was at California City, KER, 22 Oct 1983 (MH; 333-1986). One was on Southeast Farallon Island, SF, 12–15 Sep 1986 (PP†; 60-1987). One was at Fairhaven, HUM, 13–14 Sep 1986 (JSt, LPL; 433-1986). Another on Southeast Farallon Island, SF, 19–22 Sep 1986 (PP†; 61-1987), was found weakened and died on the later date (CAS #84371). One at Carpinteria, SBA, 1 Oct 1986 (TEW; JLD, PEL; 447-1986), is the first for Santa Barbara County.

YELLOW-GREEN VIREO *Vireo flavoviridis* (16). One was at Goleta, SBA, 11–12 Oct 1982 (PEL; 302-1986). One was at Fairhaven, HUM, 9–10 Oct 1984 (JSt; 347-1986). One was near Little Sur River mouth, MTY, 3 Oct 1986 (JML; EG, LKL; 475-1986).

This species was split from the Red-eyed Vireo in the AOU's 36th supplement (AOU 1987). The finder of the Goleta bird actually reported seeing two birds together (AB 37:225). However, he did not send in descriptions of either bird, and thus the Committee had no choice but to accept only the individual described by one of the six other birders who were there. We cannot stress enough the importance of *all* observers seeing a bird on the Review List sending in reports. Several of the accepted records listed thus far would have been rejected had there not been multiple descriptions to clinch the identification.

BLUE-WINGED WARBLER *Vermivora pinus* (7). A male was at Butterbredt Springs, KER, 9 May 1987 (MOC; JW; 167-1987). A female (Figure 6 and AB 41:380) was at the same location 29–30 May 1987 (JLD; NBB, MOC, JML, PEL, MJL, CM, GMcC, DR, LSan†, JW†; 146-1987).

There are now three records of this very rare species for Kern County, but a male and female less than three weeks apart at the tiny Butterbredt Springs oasis is remarkable.

GOLDEN-WINGED WARBLER *Vermivora chrysoptera* (28). A male was at Oasis, MNO, 23 May 1987 (SFB†, JML, PEL, MJL, GMcC, MAP, DR†; 139-1987). A male photographed (AB 41:489) at Butterbredt Springs, KER, 29–30 May 1987 (JW†; NBB, MOC, JLD, JML, PEL, MJL, CM, GMcC, DR, LSan†; 145-1987), was sometimes seen foraging with the female Blue-winged Warbler (146-1987) that was present at the same time.

YELLOW-THROATED WARBLER *Dendroica dominica* (50). One was in the Santa Ynez Mountains, SBA, 10 May 1981 (LRB; 323-1986). A singing male was tape-recorded at Hawkins Bar, TRI, 14 Jun 1982 (MRa; 248-1986). A male was singing at Fairhaven, HUM, 25 May 1985 (GSL; BRo; 422-1986). One was at Montaña de Oro State Park, SLO, 7–8 Sep 1986 (TME; CM, GPS; 16-1987). One

was at Torrey Pines State Park, SD, 8–9 Oct 1986 (JO'B; GMcC; 33-1987). One was on Southeast Farallon Island, SF, 21 Oct 1986 (SH; 9-1987). One was photographed (AB 41:489) at California City, KER, 14 May 1987 (NBB; 136-1987).

All of the above records were of the expected white-lored race (*D. d. albilora*) except possibly of the bird whose song was taped but whose plumage was not described. There are only two California records (both from mid to late fall) of individuals showing characteristics of the two yellow-lored races (*D. d. dominica* and *D. d. stoddardi*). The bird at Hawkins Bar may represent the first CBRC-accepted record based on a taped recording without any accompanying written description.

GRACE'S WARBLER *Dendroica graciae* (18). A male returned for its eighth winter to Montecito, SBA, 13 Oct 1986–19 Mar 1987 (PEL, DR; 451-1986). This bird has previously been accepted as 23-1980 (Binford 1983), 114-1984 (Roberson 1986), 3-1985 and 221-1984 (Dunn 1988), and 77-1986 (Bevier 1990). One thought to be a female returned for its third winter to another locality in Montecito, SBA, 19 Oct 1986–11 Jan 1987 (PEL; 69-1987). This bird has previously been accepted as 5-1985 (Dunn 1988) and 20-1986 (Bevier 1990). A male was at Irvine, ORA, 21 Feb–*27* Mar 1987 (BED, JLD; 169-1987). An adult returned for its third winter to Ventura, VEN, *28 Dec 1986–25 Mar 1987* (CDB, JSR; 175-1987). This bird has previously been accepted as 6-1985 (Dunn 1988) and 22-1986 (Bevier 1990). A second wintering individual was at Ventura, VEN, 14 Mar–4 Apr 1987 (RJM; 181-1987), only about 1 mile away from the other wintering bird.

The Irvine bird was published (AB 41:331) as having been at Newport Beach, but Irvine is the correct location. It is identified as a male because it was singing. If the list of singing female birds in Ritchison (1983) is complete, no female paruline warblers are known to sing.

PINE WARBLER *Dendroica pinus* (22). One was in the Tijuana River valley, SD, 15 Oct 1986 (GMcC; 32-1987). An immature female was at Montaña de Oro State Park, SLO, 26–27 Oct 1986 (TME; JH, KAH, GPS; 27-1987). An immature male was at Gaviota State Beach, SBA, 30 Oct 1986 (PEL; 472-1986). An immature female was at Gaviota State Beach, SBA, 1 Nov 1986 (TEW; 473-1986). An immature female in the Tijuana River valley, SD, 8 Nov 1986 (GMcC; 237-1987), was accompanied by an immature male (GMcC; 30-1987). One was at Point Dume, LA, 21 Dec 1986 (KLG; 4-1987). A singing male was at Torrey Pines State Park, SD, 5–6 Jun 1987 (GMcC; 188-1987).

The six Pine Warblers found in southern California in fall 1986 were unprecedented, as this species had formerly been very rare. Even more unusual were the immature male and female found together in the Tijuana River valley. The Torrey Pines individual is only the third found in California in spring.

*PROTHONOTARY WARBLER *Protonotaria citrea* (65). One was at Point Loma, SD, 10 Oct 1979 (CGE; 369-1986). One was at Samoa, HUM, 18–19 Sep 1982 (RAE; 167-1986). One was at San Diego, SD, 9 Oct 1982 (VPJ; 267-1986). One was in the Loleta bottoms, HUM, *24 Nov 1982–6 Mar 1983* (JSt; 427-1986). One was at Lanphere Dunes, west of Arcata, HUM, *23* Sep 1983 (RR†; 476-1986). One was at Point Fermin, LA, 19 Sep 1984 (BED; 297-1986). One was at McKinleyville, HUM, 11–14 Sep 1986 (JSt; 434-1986). One was at Pacific Grove, MTY, 13–20 Sep 1986 (JML, GMcC, DR; 367-1986). One was at Point Reyes NS, MRN, 18–21 Sep 1986 (BDP; MW†; 380-1986). One was near San Pedro, LA, 16–25 Oct 1986 (JLD, ALH†, PEL, CM, GMcC; 439-1986). A male was at Oceano Campground, Pismo State Beach, SLO, 17–22 Oct 1986 (KJZ; JLD, CM, RER; 423-1986). A male was at Butterbredt Springs, KER, 10 May 1987 (SEF, PEL; 135-1987). A female was at California City, KER, 28 May 1987 (NBB, JLD, JW; 144-

1987). A male was at Oceano Campground, Pismo State Beach, SLO, 28 May 1987 (CM; 161-1987).

The bird at Loleta bottoms established the second California winter record for the Prothonotary Warbler.

WORM-EATING WARBLER *Helmitheros vermivorus* (37). One was at Merced NWR, MER, 31 Oct 1978 (RJB; 350-1986). One was on Southeast Farallon Island, SF, 30 May–1 Jun 1986 (PP†; 383-1986). One photographed on Southeast Farallon Island, SF, 12–13 Oct 1986 (KFH†; fide PP; 205-1987), has not been previously published. One was at Morongo Valley, SBE, 30 Apr 1987 (NBB; 132-1987). One was at Butterbredt Springs, KER, 10 May 1987 (PEL; SEF, JW†; 133-1987). One was on Southeast Farallon Island, SF, 13 Jun 1987 (PP; SFB†; 149-1987).

The Merced bird (Figure 7) established the single record for the Central Valley.

KENTUCKY WARBLER *Oporornis formosus* (36). A male was on Southeast Farallon Island, SF, 10 Jun 1986 (PP†; 384-1987). A female was at La Crescenta, LA, 11 Sep–18 Oct 1986 (JLD†, KLG, CM, 448-1986). A male was at Los Osos, SLO, 7 Dec 1986–1 Feb 1987 (ELB; JLD†, PEL, CM, JEM, GPS†; 13-1987). One was at Point Loma, SD, 5–7 May 1987 (GMcC; 187-1987). A female on Southeast Farallon Island, SF, 9 May 1987 (PP†; 206-1987), furnished the earliest spring record for this locale. A male was at Mojave, KER, 10 May 1987 (SEF, PEL; 134-1987). A male was at Galileo Park, KER, 15 May 1987 (JW; CM; 160-1987). A singing male was at Kern River Preserve, KER, 16 May 1987 (WCH; 166-1987). A singing male at Morongo Valley, SBE, 17 May 1987 (DRW; 183-1987), was judged to probably be the same one still there 24 May 1987 (DGo; 184-1987); in AB 41:490, however, these were considered separate individuals. A bird at Oasis, MNO, 25 May 1987 (BL; SFB, MAP; 141-1987) was judged to be the same as one there 27 May (JML; 256-1987), although they were previously published (AB 41:490) as separate individuals. A male was at Deep Springs, INY, 25–27 May 1987 (MJL; SFB, JML; 142-1987). A male was at Butterbredt Springs, KER, 27-29 May 1987 (JSR; JLD, JW; 165-1987). A male was at Furnace Creek, Death Valley NM, INY, 30 May 1987 (MAP; 182-1987).

This normally very rare vagrant to California had an unprecedented invasion in spring 1987 with 11 individuals being reported for the state (one still under review). Vagrant eastern warblers that visit our state appear to have definite wave years, which I believe may correlate with exceptionally successful breeding and/or wintering seasons. Several Committee members mentioned the difficulty in sexing first-year male and female Kentucky Warblers. The 25–27 May 1987 Oasis bird illustrates this problem. For additional information see Pyle et al. (1987).

CONNECTICUT WARBLER *Oporornis agilis* (31). Two were on Southeast Farallon Island, SF, 12 Sep 1986 (both PP†; 62-1987 and 63-1987). One of these birds (62-1987) died when a Western Gull (*Larus occidentalis*) was found trying to pull it from a mist net. It is now CAS #84370.

Hand-held Connecticut (62-1987) and Mourning (64-1987) warblers are shown together in Figure 8.

MOURNING WARBLER *Oporornis philadelphia* (40). A male was at California City, KER, 16 May 1986 (JW; TME; 331-1986). An amazing five were on Southeast Farallon Island, SF, in fall 1986: one 3 Sep (PP†, 66-1987), one 10 Sep (PP†; 67-1987), two 12 Sep (both PP†; 64-1987 and 65-1987), and one 20 Oct (PP†; 6-1987). One at Carmel River mouth, MTY, 4 Nov 1986 (DR; 436-1986), established the latest fall record by two weeks. A male was on Southeast Farallon Island, SF, 7 Jun 1987 (SFB; PP†; 148-1987).

Six Mourning Warblers in 1986 accounted for northern California's best fall ever, although there were five in fall 1974. Two Connecticut and two Mourning warblers on Southeast Farallon Island 12 Sep 1986 were certainly noteworthy.

Variations in characters distinguishing spring male Mourning and MacGillivray's (*O. tolmiei*) warblers were discussed by Lanyon and Bull (1967), Hall (1979), and Pitocchelli (1990). Although four adult male Mourning Warbler specimens examined by Hall had eye-arcs when examined with a magnifying glass, lack of eye-arcs seems quite reliable for Mourning Warblers seen well in the field. He considered the black lore to be of no value and the black apron to be of little value for distinguishing the two species. Pitocchelli found that MacGillivray's Warblers all have eye-arcs and dark lores but that plumage of Mourning Warblers is more variable with some having eye-arcs and others having dark lores. Although Cox (1973) questioned the specific status of these two species, Pitocchelli believed they should remain separate.

In his comments on one of the fall records, Bevier mentioned examining some fall adult female Mourning Warbler specimens from the Isle of Shoals, Maine, that have creamy-whitish eye-arcs, no supra-loral line, and whitish-buff throats. All, however, have Mourning Warbler measurements! For an excellent discussion of female and immature *Oporornis* warblers see Pyle and Henderson (1990).

SCARLET TANAGER *Piranga olivacea* (48). A female was at Morro Bay, SLO, 11 Nov 1984 (KLG; 459-1986). A male was at San Juan Capistrano, ORA, 5 Jun 1986 (MPtr; 330-1986). A singing male was at Lopez Lake, SLO, 14 Jun 1986 (CM; 269-1986). An immature male was at Thousand Palms Oasis, RIV, 3 Oct 1986 (JLD; 449-1986). An immature male was at Palos Verdes, LA, 30 Oct–*2* Nov 1986 (BED; RAE, DRW; 41-1987). A female at Coronado, SD, 7 May 1987 (EC; 176-1987), represents the earliest date for a California spring vagrant by almost two weeks. A singing male was at Fairhaven, HUM, 7 Jun 1987 (GSL; LPL; 219-1987). See Kaufman (1988) for a discussion of female tanager identification and representative photographs.

PAINTED BUNTING *Passerina ciris* (16). An immature was at Gaviota State Beach, SBA, 1–*2* Sep 1986 (CDB; GSL, HPR; 474-1986). A first-year female was on Southeast Farallon Island, SF, 23 Sep 1986 (PP†; 58-1987). An adult male at Scotty's Castle, INY, 22 May 1987 (PEL; JLD, SEF, JML, MJL; 138-1987), represents only the second accepted spring record for southern California.

CASSIN'S SPARROW *Aimophila cassinii* (16). One (Figure 9) was on Southeast Farallon Island, SF, 22 Sep 1986 (PP†; 59-1987). For separating Cassin's from Botteri's Sparrow, see Kaufman's (1990) excellent text, which includes the chapter that appeared earlier in *Birding* (Kaufman 1989).

LE CONTE'S SPARROW *Ammodramus leconteii* (10). A juvenile wason Southeast Farallon Island, SF, 11–12 Sep 1986 (PP†; 54-1987). Another on Southeast Farallon Island, SF, 11–*12* Oct 1986 (KFH†, fide PP; 212-1987), had already molted into first basic (winter) plumage.

The September 1986 bird (Figures 10 and 11) was remarkable because of its early date and even more impressive because it was apparently in juvenal plumage. There are, however, two additional September records (thirteenth report). Bevier (in voting comments) mentioned that Le Conte's Sparrows typically do not leave their breeding grounds until September, with 5 and 14 September being the earliest dates for Iowa (Dinsmore et al. 1984) and 8 October being the earliest for Texas (Oberholser 1974). Pyle (in voting comments) suggested that Le Conte's Sparrows may have a supplemental (pre-first basic) plumage as do Indigo Buntings (*Passerina cyanea*) (Rohwer 1986), Cassin's (*Aimophila cassinii*) and Bachman's (*A. aestivalis*) sparrows (Willoughby 1986), and some other passerine species.

*SHARP-TAILED SPARROW *Ammodramus caudacutus* (34). An immature at Arcata marsh, HUM, 22 Oct 1986–27 Jan 1987 (LPL, DR, JSt; 431-1986), established the first record for that county. One was at Bolinas Lagoon, MRN, 28 Nov 1986 (BDP; 452-1986). One at Morro Bay State Park, SLO, 2 Nov 1986 (KAH, CM, GPS†;14-1987), is previously unpublished. Three were at Palo Alto Baylands, SCL, 4 Nov 1986–29 Jan 1987 (SEF; WGB, GH, JM, DLS; 21-1987).

This is the last CBRC report that will include records of the Sharp-tailed Sparrow because the species has been off the Review List since the tenth report (Dunn 1988). Therefore, a few closing comments seem appropriate for Bolinas Lagoon and Palo Alto Baylands, where it has been difficult to determine which records represent returning individuals.

With the exception of the winter periods 1979–80 and 1981–82, for which the Committee received no written reports, Bolinas Lagoon has had as many as three wintering Sharp-tailed Sparrows since Feb 1977 (14-1977, Luther 1980; 222-1980, Binford 1985; 38-1982 and 120-1982, Morlan 1985; 121-1983, Roberson 1986; 255-1984, Dunn 1988; 160-1985, Bevier, 1990; and 452-1986 reported above). AB 33:804 reported four in winter 1978–79. The banded bird in winter 1980–81 (222-1980, Binford 1985) was not reported again.

Records previously reported and accepted from Palo Alto Baylands begin with one bird 8 Feb 1978 (79-1978, Luther et al. 1983) and end with the three reported above for winter 1986–87. At this location, there were several winters (1979–80, 1981–82, 1984–85, and 1985–86) for which the Committee received no reports but AB sometimes did. Morlan (1985) discussed these in more detail. Any additional information about birds seen during these years would be welcome.

Figure 11. Juvenile Le Conte's Sparrow (*Ammodramus leconteii*) on Southeast Farallon Island, San Francisco County, California, 11–12 Sep 1986.

Photo by Peter Pyle

SNOW BUNTING *Plectrophenax nivalis* (24). One was on Southeast Farallon Island, SF, 10 Nov 1986 (PP†; 7-1987). One was at Bodega Head, SON, *30 Nov* 1986 (JC†; 75-1987). One was at King Salmon, HUM, 6–8 Dec 1986 (LPL, JM†, DR†; 453-1986).

COMMON GRACKLE *Quiscalus quiscula* (14). One was at Furnace Creek, Death Valley NM, INY, 23 May 1983 (JSt; 429-1986).

UNACCEPTED RECORDS, identification questionable

YELLOW-BILLED LOON *Gavia adamsii*. One in Monterey Harbor, MTY, in early Nov 1980 (162-1986). One at Point Lobos State Reserve, MTY, 29 Dec 1986 (17-1987).

Both reports received 0–10 first-round votes. For identification tips, see references listed under accepted records.

TOWNSEND'S SHEARWATER *Puffinus auricularis*. One west of the Cordell Bank, MRN, 16 Jun 1985 (69-1985).

Although this report was published (AB 39:957), it was a very difficult one for CBRC members, beginning with its first round in Dec 1985 and ending in Mar 1988 with a fourth round, prior to which it was discussed at the Jan 1987 annual CBRC meeting. Of the fifteen Committee members who eventually voted on this report, only three (who were able to vote more than once) kept their "accept" vote throughout and only three kept their "unaccept" vote throughout. This very controversial report finally received a 5–5 vote.

Had it not represented the first record for the state as well as for North America north of Mexico, this report might have been accepted. Most members who did not accept it commented that they believed the observers were capable of identifying *Puffinus auricularis* and may have seen one. A few members thought that Townsend's Shearwater proper (*P. a. auricularis*), which breeds on the Revillagigedo Islands off western Mexico, had not been definitively separated from Newell's Shearwater (*P. a. newelli*), which breeds on the Hawaiian Islands. The three observers who submitted this report are experienced seabird observers. However, they rarely have to describe the birds they census with the thoroughness and detail that is required to document first state records. I believe that if one or more records of Townsend's Shearwater are accepted for the state, this report will be reviewed again and accepted. A 28 Oct 1990 sighting from Cordell Bank is currently under review. It is important to restate that all CBRC reports that are not accepted can be reevaluated if new and substantial information concerning that species or that sighting surfaces. All researchers have access to unaccepted as well as accepted reports.

Many interesting comments on field marks for this difficult seabird group are part of the 62-page record. Jehl's (1982) paper on Townsend's Shearwater is certainly worth reading, as is Stallcup's (1990) book on ocean birds, Harrison's (1983) text, and Dunn's (1988) discussion of the unaccepted 27 Aug 1977 Manx Shearwater (*P. puffinus*) report.

TRISTRAM'S STORM-PETREL *Oceanodroma tristrami*. One described but poorly photographed on Monterey Bay, MTY, 9 Oct 1977 (411-1986). One west of Santa Cruz, SCZ, 11 Oct 1986 (412-1986).

Both of these reports were not accepted (0–10) on their first round. The October 1977 bird was not accepted even by two Committee members who saw it. These reports serve primarily to alert Pacific-coast birders to study the literature on Tristram's (called Sooty Storm-Petrel in AOU 1983 but changed in AOU 1989),

UNACCEPTED RECORDS, identification questionable (Cont.)

Markham's (*O. markhami*), and Matsudaira's (*O. matsudairae*) storm-petrels. Pratt et al. (1987) noted that Tristram's has a paler rump than the other three species. This feature shows up nicely in one of the photos in Harrison (1987), which also shows a bluish-gray sheen to the rump. Pratt et al. (1987) suggested that the white bases of the primary shafts of Matsudaira's Storm-Petrel is often difficult to see at any distance, but both photos in Harrison (1987) show it clearly. However, Dunn (pers. comm.) has seen white at the base of Black Storm-Petrel (*O. melania*) primaries when the birds were extremely close, so caution with this field mark is recommended. Brown (1980) said that shallow wing beats and much gliding are the best way to separate Markham's from Black Storm-Petrel. From recent experience, Roberson (pers. comm.) says gliding is just one of several good characters, which include differences in tail length, shape, and carpal bar prominence.

CHINESE POND HERON *Ardeola bacchus*. One at Brawley, IMP, 21 Jan 1987 (87-1987). In comments on the 0–10 vote, most of the seven members who questioned the identification mentioned that even if it had been properly identified they would have questioned its natural occurrence. Some thought that a Cattle Egret (*Bubulcus ibis*) in alternate plumage was not eliminated.

BLACK-BELLIED WHISTLING-DUCK *Dendrocygna autumnalis*. Two at Border Field State Park, SD, 24 May 1986 (36-1987), received a 2–8 vote. Although this report was published (AB 40:523), it wassuggested that these birds were probably escapees. Most CBRC members who questioned the identification indicated also they would not accept because of a questionable origin. So far the CBRC has not accepted any coastal reports of this species, but all coastal sightings should be submitted to the Committee as numbers of this species are increasing in Arizona and it is a casual visitor to the Salton Sea. A sighting from there in 1912 has not been submitted to the CBRC for review. The earliest accepted record dates back to June 1951 at Calipatria.

TRUMPETER SWAN *Cygnus buccinator*. One at Lower Klamath NWR, SIS, 4 Feb 1979 (195-1986). Twenty birds near Clear Lake NWR, MOD, 6 Jan 1984 (68-1987). One at Diaz Lake, near Lone Pine, INY, 15 Dec 1984 (29-1985).

The main problem with the Lower Klamath report was the very brief description from only one of the six observers. The Clear Lake report was of 20 birds identified from a plane. Although the reporter has considerable experience identifying swans from plane surveys in Alaska, the race of the Canada Geese (*Branta canadensis*) with which these were observed for size comparison was not determined, and the birds were never relocated and studied from the ground.

The Lone Pine bird was published (AB 39:785), but not accepted (4–6) on its third circulation. Those supporting this report believe the calls were properly identified because the observer had considerable experience with Tundra Swans (*Cygnus columbianus*) wintering in the Sacramento Valley. Most of those not accepting the report believe that Trumpeter and Tundra swan voices are so variable that voice alone cannot be used to separate these species. See comments under accepted records of Trumpeter Swan for various problems faced by sightings of this species reported in California.

TUFTED DUCK *Aythya fuligula*. A female at Lopez Lake, SLO, 27 Jan 1986 (204-1986). Two males also reported from here in early 1986 were previously accepted (Bevier 1990). The change from the 6–4 first-round to the 2–8 final-round vote reflects the Committee's increased caution with females of this species in which *all* the appropriate field marks are not seen. In this case, not only was the bird never refound, but the wing pattern was not observed as the bird did not fly or flap its wings, the described bill pattern did not seem correct, and there was only the hint of a tuft.

UNACCEPTED RECORDS, identification questionable (Cont.)

The increased number of male *Aythya* hybrids found in the state in recent years has made many aware of the possibility of female hybrids and increased the need for more caution with reports of this species. Interesting comments on hybrids by Gillham et al. (1966), Gillham (1988), and Harris et al. (1989) should be examined by those who report this species.

MISSISSIPPI KITE *Ictinia mississippiensis*. One at Pigeon Point, SM, 5 Apr 1984 (211-1986). One at Sepulveda Basin, Encino, LA, 14 Jan 1987 (44-1987).

Votes on the Pigeon Point report went from 7–3 in the first round (based on the description) to 4–6 in the second round. Concern arose over the very early date, the observer's distance from the bird, and the angle of the sun. In the second round some members mentioned interesting early dates apparently unknown to others who did not accept primarily because of the 5 Apr date. Bevier's first-round comments mentioned dates ranging from 26 Dec to 17 Feb (Oberholser 1974), a 15 Mar record from northern Texas (AB 37: 886), and a flock of 250 birds on 23 Mar at Santa Ana NWR in Texas (AB 38:932). In second-round comments, Roberson mentioned a 9 Apr record from Cape May (Leck 1984) and a 12 Apr record from Iowa (Dinsmore et al. 1984).

The 0–10 vote on the Jan 1987 Encino report reflects the report's winter date as well as an unconvincing description.

ZONE-TAILED HAWK *Buteo albonotatus*. One seen without binoculars at Torrance, LA, 20 Oct 1984 (24-1985), was not accepted (6–4) after four rounds of voting and discussion at an annual CBRC meeting.

WILSON'S PLOVER *Charadrius wilsonia*. Five at the south end ofthe Salton Sea, IMP, 31 Aug 1986 (88-1987). At a time of year when the Salton Sea area is so heavily birded, five adults by a single observer who was unaware of the species' status in California (three records) expectedly received a 1–9 vote. However, the species has nested once at the Salton Sea (Garrett and Dunn 1981), a report currently under review.

BAR-TAILED GODWIT *Limosa lapponica*. One at Los Peñasquitos Lagoon, SD, 19 Dec 1982 (168-1986) was not accepted (3–7) after two circulations. Although the report submitted ran to just over three single-spaced typed pages and most of what was decribed fit the Bar-tailed Godwit, there were several problems. Most CBRC members were concerned that the observation took place "five to fifteen minutes after sunset" and that several key field marks such as underwings, rump, uppertail coverts, and tail patterns and colors were not described. Several members supporting the report felt the marks seen were enough to eliminate similar species.

WHITE-RUMPED SANDPIPER *Calidris fuscicollis*. One at the Salinas River mouth, MTY, 6 Nov 1980 (164-1986). One at Wilbur, KIN, 18 Sep 1984 (286-1986). One at the Salinas sewage ponds, MTY, 2 Oct 1986 (386-1987).

Two of the descriptions were far too brief for a bird so rare. In at least one case, a Red Knot (*Calidris canutus*) was suspected to account for the report. Any of the three would have represented only the third fall record for this species. Extremely good documentation is thus required for such a sighting to be accepted.

THICK-BILLED MURRE *Uria lomvia*. One at Crescent City harbor, HUM, 20 Jun 1987 (220-1987). While most records of this species are from late summer through early winter, a June occurrence would certainly fit in with other California records of alcids such as the Horned Puffin (*Fratercula corniculata*) and Least Auklet (*Aethia pusilla*), which have similar northern breeding ranges. The incompleteness of the description, however, contributed heavily to the 3–7 vote.

UNACCEPTED RECORDS, identification questionable (Cont.)

BROAD-BILLED HUMMINGBIRD *Cynanthus latirostris*. A female present at a hummingbird feeder in Santa Cruz, SCZ, 5 Oct–8 Nov 1985 and again 15 Jun–27 Aug 1986 (360-1986) was joined by an immature on 18 Aug 1986 (361-1986).

Both of these reports were previously published (AB 41:140). A very detailed description of these birds was sent in by an observer who saw both on 18 Aug 1986. Two photographs of the female taken by the homeowner in early Oct 1985 and a color slide taken 8 Nov by a visitor were both submitted with the written description. Many of the Committee's comments centered around anomalies visible in the photographs or mentioned in the written description that suggested the female might be a hybrid. In particular, the bill color and pattern were wrong, and the green flecking seen on the throat should not occur. Females of this species have dusky-gray throats. Several CBRC members thought one of the parents in each case was probably a Broad-billed Hummingbird, but there was no consensus concerning the other parent. The immature was observed for only about 30 seconds, but comparison of its description with specimens at both the MVZ and CAS suggested that it too might be a hybrid. The dates as well as the improbability of two individuals of this species at the same feeder so far north also contributed to first-round votes of 4–6 (female) and 2–8 (immature).

ALDER FLYCATCHER *Empidonax alnorum*. One on Southeast Farallon Island, SF, 4 Sep 1985 (187-1985), would have been California's first record.

This report was published (AB 40:331) but with the disclaimer that the bird was identified by comparison with measurements from Stein (1963). It did not mention that the identification was also based on papers by Phillips (1948) and Aldrich (1951) plus examination of 150+ skins (from a wide range of geographic populations) at MVZ and CAS. Stein's (1963) data have been questioned because differences among sex and age categories were studied only superficially, and geographic sampling of breeding populations was incomplete (letters from consultants N. K. Johnson, J. V. Remsen, Jr., and T. S. Schulenberg). Phillips et al. (1966, 1970) said these species are too similar for banders to try to distinguish and thus all should be listed as Traill's Flycatchers. Several of the measurements fell outside the range known for the Willow Flycatcher (*E. traillii*), and neither call notes nor song was heard from the Southeast Farallon Island bird. Descriptions and/or sonograms of the call or song are necessary to identify Alder and Willow flycatchers conclusively (Zink and Fall 1981, Whitney and Kaufman 1986).

As pointed out by several consultants and Committee members, the carefully collected measurements of the bird do not rule out the Willow Flycatcher. Even if the bird had been collected, at present many specimens of these two species can not be identified. Comments about a prominent loral spot on the Southeast Farallon Island bird can also not be considered (at present) useful since specimens of both species can exhibit this loral spot, as can be seen in photographs of both species (Whitney and Kaufman 1986, Farrand 1983). In the end, the report received a 1–9 vote.

SCISSOR-TAILED FLYCATCHER *Tyrannus forficatus*. One at Lafayette, CC, 3 May 1981 (354-1986). Although this report was published (AB 35:860), it was not acccepted (1–9) by the Committee because the description and observation were both too brief.

CURVE-BILLED THRASHER *Toxostoma curvirostre*. One at Fort Piute, SBE, 16 May 1987 (180-1987), was published as possibly that species but more likely the similar Bendire's Thrasher (*T. bendirei*), which breeds at this location (AB 41:489). The report received a 0–10 vote primarily because of the unusual date, the brevity of the view, and the lack of a description of the underparts, which therefore did not eliminate Bendire's Thrasher.

UNACCEPTED RECORDS, identification questionable (Cont.)

RED-THROATED PIPIT *Anthus cervinus*. One at Westley, STA, 6 Nov 1980 (166-1986). One at Tennessee Valley Cove, MRN, 17 Apr 1987 (128-1987).

The Westley bird would have represented the first Central Valley record. The Tennessee Valley Cove bird would have constituted the first spring record for California.

PHILADELPHIA VIREO *Vireo philadelphicus*. One at Big Sycamore Canyon, VEN, 14 Oct 1978 (36-1981). One at Point Reyes NS, MRN, *21*–27 Sep 1986 (50-1987).

The Big Sycamore Canyon report was published (Garrett and Dunn 1981 and AB 33:216). This report was very difficult for the Committee (6–4 after four circulations and discussion at an annual meeting) because most members believe the bird was correctly identified. The observer is one of the best in North America and certainly well qualified to identify this species, but the description (not written for the CBRC and not submitted to it by the observer) was considered inadequate to separate this species from similar ones. The observer, although believing the sighting was correct, asked for the report to be withdrawn after its second circulation. However, CBRC rules do not permit a report to be withdrawn after it has begun circulation, and a few members later voted against it because of this request.

The Point Reyes sighting was published (AB 41:140–141), but only with the latter date. The extremely brief description and the fact that only this observer reported the bird (on both weekends) from an area so heavily birded in fall contributed to the 2–8 vote.

BLUE-WINGED WARBLER *Vermivora pinus*. One at Lafayette, CC, 29 Sep 1984 (44-1985) was published (AB 39:100).

BLUE-WINGED × GOLDEN-WINGED WARBLER *Vermivora pinus* × *chrysoptera*. One at Moss Landing, MTY, 27 Nov 1986 (463-1986). "Lawrence's" Warbler (the hybrid form described) is the rarest of the hybrids produced by these two species (Parkes 1951). Moreover, the bird's flying up to a telephone wire and sitting with blackbirds and House Finches (*Carpodacus mexicanus*) seemed behavior very unusual for a *Vermivora* warbler. The sighting was brief, by a single observer, and there were problems with the description, so the record was not accepted (1–9). There are only two accepted California records for hybrids of these two species (Winter and McCaskie 1975, Dunn 1988).

CERULEAN WARBLER *Dendroica cerulea*. One at Tapia Park, Malibu Canyon, LA, 17 Nov 1986 (464-1986). After publication by Lehman (1987) of an article on problems associated with immature Blackburnian and Cerulean warblers, and because of the presence of a dull Blackburnian 15–23 Nov 1986 foraging high in the same trees, the initial finder requested this report be withdrawn. As mentioned previously, however, once a report begins circulation, it cannot be withdrawn. The report was not accepted (2–8) because of the very poor viewing conditions (overcast and drizzly), the presence of a dull female Blackburnian Warbler in the same trees, and there being only nine Cerulean Warbler records for California.

CONNECTICUT WARBLER *Oporornis agilis*. One at Carpinteria Creek, SBA, 25 Sep 1983 (133-1983), was published (AB 38:248). One at Point Reyes NS, MRN, 20 Sep 1984 (212-1984), was also published (AB 39:100).

Both of these reports generated much lively and informative discussion on *Oporornis* identification. The Carpinteria bird received a 5–5 vote after four circulations and discussion at an annual CBRC meeting. Five expert consultants reviewed the report and hundreds of specimens were checked in seven museum collections. It seems clear that the Connecticut Warbler has a distinctive walk similar to the

UNACCEPTED RECORDS, identification questionable (Cont.)

Ovenbird's (*Seiurus aurocapillus*), whereas the Mourning Warbler hops (Lehman 1984, Pyle and Henderson 1990). However, one Committee member and one consultant have seen a Mourning Warbler walk briefly, but not at such length and as deliberately as the Connecticut Warbler and Ovenbird. Because plumage can be so variable, several members place much emphasis on walking by the Connecticut Warbler. According to Clark (1975), most bird species move either asynchronously (by walking) or synchronously (by hopping). The birds involved in both of these unaccepted reports were observed to walk repeatedly, and this was the main reason for the votes to accept the sightings. Several other Connecticut Warbler traits were exhibited by the Carpinteria individual. In the end, however, the reports were not accepted primarily because both birds were described as having distinctly yellow throats and no one could find a Connecticut Warbler specimen showing distinct yellow on the throat or even a small break in the breast band that creates the hooded effect in this species. There is a photograph of a Connecticut Warbler with a yellow throat in Pyle and Henderson's (1990) article on separating female and immature *Oporornis* warblers in fall.

For both reports, the idea of a hybrid was dismissed for lack of any known hybrids involving a Connecticut Warbler (Cockrum 1952). The lack of hybridization with Mourning Warbler is especially interesting since there is about a 90% overlap in the breeding ranges of these two species (Godfrey 1986).

The Point Reyes bird also was subjected to four circulations and discussion at one annual CBRC meeting. There is a published sighting (AB 39:100) of a Mourning Warbler on the same date (21 Sep 1984) from the same Point Reyes location that remains unreviewed by the CBRC and may have contributed some confusion for both the observers and Committee members.

MOURNING WARBLER *Oporornis philadelphia*. One at Furnace Creek, Death Valley NM, INY, 25 May 1987 (179-1987), was published (AB 41:490). The CBRC did not accept this report primarily because of the extremely brief description and an inappropriate statement about the entire head, neck, and bib being black. See Pitocchelli (1990) and Pyle and Henderson (1990) for the most recent discussion of field marks used to identify difficult Mourning Warbler plumages.

*SHARP-TAILED SPARROW *Ammodramus caudacutus*. One at Limantour Estero, Point Reyes NS, MRN, 21 Dec 1984 (396-1986).

COMMON GRACKLE *Quiscalus quiscula*. One near Los Baños, MER, 4 Aug 1980 (335-1986).

UNACCEPTED RECORDS, natural occurrence questionable (identification accepted)

KITTLITZ'S SANDPLOVER *Charadrius pecuarius*. One photographed at San Diego River mouth, SD, 26 Dec 1970 (363-1986) had been banded. The bird clearly was identified correctly. Although widely distributed in Africa (Urban et al. 1986), this species is primarily sedentary, with a May 1913 record for southern Norway being the farthest one away from the African breeding grounds (Hayman et al. 1986). For unknown reasons this Norway record was not cited by Cramp et al. (1983) or Urban et al. (1986). However,Dunn and Morlan (pers. comm.) saw Israel's second and third records of this species in November 1986, suggesting that there is more movement away from Africa than implied by these publications.

CORRIGENDA TO ELEVENTH REPORT (Bevier 1990)

Under Accepted Records: The final date of record 38-1985 (Yellow-billed Loon) is 26 Jan 1969, not 25 Jan 1969. The location for record 239-1986 (Scissor-tailed Flycatcher) is Prado Regional Park, SBE, not Prado Basin near Corona, RIV. The year for record 231-1986 (Blue-winged Warbler) is 1984, not 1986.

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FIRST RECORD OF THE LONG-TOED STINT IN CALIFORNIA

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On 29 August 1988 we, along with Douglas R. Willick and Kurt Radamaker, identified a juvenile Long-toed Stint (*Calidris subminuta*) at the sewage ponds in Salinas, Monterey County, California. At about 1230 PDT, Daniels noticed an unfamiliar small *Calidris* sandpiper sitting at the edge of one of the large rock-lined sewage ponds with some Least (*C. minutilla*) and Western Sandpipers (*C. mauri*); he and Willick watched it for about 20 minutes before Patten and Radamaker arrived. The weather was clear and mild with a slight breeze, so observation conditions were excellent. We studied the bird through binoculars and telescopes for the remainder of the afternoon at distances as close as 20 feet.

The following description is based on our field notes, on those of various observers who sent details to the California Bird Records Committee (CBRC), and on photographs.

Our bird was a small *Calidris* slightly larger than a Least Sandpiper. It was similar in shape to a Least, but had a longer neck, longer legs (in particular, longer tibiae), and a shorter, straighter bill (about 75% as long as the head). The crown sloped to a high point at the rear, unlike a Least's. The middle toe seemed to be as long as the tarsus and was clearly longer than the bill. The legs and feet were straw yellow, a bit brighter than a Least's. The bill was blackish, except for a pale base to the mandible. In flight, the toes extended beyond the tip of the tail. There was a very thin whitish trailing edge to the greater secondary coverts, but this did not create an obvious wing stripe. The tertials were long and concealed the folded primaries.

The crown was black with narrow bright rufous streaks that were more prominent posteriorly. The bird had a capped appearance resulting from a distinct separation between the crown and the brownish-gray nape and bold white supercilium. The nape was finely streaked with black. The dark crown ran down through the forehead, meeting the bill and a dark trans-ocular line. This line dipped downward slightly before the eye, forming a bulbous white loral spot. Thin buffy-white lateral crown stripes were very distinct, forming a split supercilium. The supercilium was whitish and flared slightly behind the eye before stopping abruptly at the nape; it seemed somewhat broader than a Least Sandpiper's and was cleaner white before the eye and dirtier (a bit streaked) behind the eye. The face was mostly white with a uniform dull brownish-gray ear patch that was finely streaked with black; a tinge of chestnut was visible on the posterior edge of the cheek. The chin and throat were clean white. The breast was very pale buff or whitish at the center, gradually becoming more buffy toward the sides. The breast was streaked with dusky, very finely at the center and more heavily toward the sides. The undertail coverts and belly were white.

The blackish mantle feathers were thinly edged in rufous, creating a pattern of rufous and black stripes. The blackish scapulars and tertials were edged in bright rufous, with the edges on the outermost tertial duller than those of the inners. The blackish median and lesser coverts were edged with buffy white, contrasting slightly with the pale chestnut edgings on the greater coverts. The fringes of the greater wing coverts and scapulars were broken at the tip by a black shaft streak. The scapulars and wing coverts of this bird were longer and more pointed than those of a juvenile Least Sandpiper, which are shorter and more diamond-shaped. Buffy-white stripes

on the sides of the mantle formed a prominent "V" on the back. The tail pattern was like that of a Least.

The flight call, heard several times, was a mellow, rolling "chrrrup" or "prrrt," lower pitched than that of a Least Sandpiper. The bird fed by walking jaçana-like on floating vegetation and picking insects from the surface. It had a strange tumor-like growth on the right cheek that slightly raised the feathers away from the face.

The bird was last reliably reported on 2 September 1988. Additional photographs were published in *American Birds* 42:1226 and 43:27 and by Wilds (1988). The record, the first for California and only the third for North America outside of Alaska, was unanimously accepted by the CBRC on the first round (McCaskie and Pyle in manuscript) and is now on file, with over 20 color photographs, at the Western Foundation of Vertebrate Zoology, Los Angeles.

Figure 1. Long-toed Stint, Salinas sewage ponds, 31 August 1988. The extremely long toes and pale base to the mandible are visible in this photograph. In particular, note the whitish edges of the lesser and median coverts versus the bright rufous edges of the scapulars.

Photo by Lawrence Sansone

DISTRIBUTIONAL SUMMARY

The Long-toed Stint nests in disjunct populations in the forested areas of Siberia from the River Ob' east to the Chukotski Peninsula, the Commander Islands, the northern Kurile Islands, and (probably) the Kamchatka Peninsula (Cramp and Simmons 1983, A.O.U. 1983, Flint et al. 1984). Display flights and similar behavior have prompted speculation that the bird may occasionally nest in Alaska (Roberson 1980, Balch 1988, Armstrong 1990). The species winters from the Philippines, Formosa, southeastern China, and eastern India south to Ceylon through Indonesia to southern Australia (A.O.U. 1983, Cramp and Simmons 1983, Blakers et al. 1984). A few may also winter regularly in eastern Africa, because small numbers pass through the Middle East (Hayman et al. 1986, Hollom et al. 1988).

Long-toed Stints have occurred three times as vagrants in Europe: once in Sweden, 4 October–5 November 1977 (Pettersson et al. 1978), once in Britain, 28 August–1 September 1982 (Rogers et al. 1985), and again in Britain, 6–7 September 1990 (Nightingale and McGeehan 1990); each was a juvenile. There are at least nine records for Africa (Urban et al. 1986) and for Christmas Island and the Seychelles in the Indian Ocean (Hayman et al.

Figure 2. Long-toed Stint, Salinas sewage ponds, 29 August 1988. Here the combination of the dark forehead (extending down to the bill), the bulbous white loral spot, the dark comma-shaped loral stripe, and the bold white supercilium are evident. Note the bulge of a presumed tumor on the lower cheek.

Photo by Peter La Tourrette

1986). Also, a juvenile was collected 26 August 1967 on Midway Atoll, Hawaiian Islands (Clapp 1968).

In North America, Long-toed Stints occur regularly in the outer Aleutian Islands (east to Adak) and casually to the Pribilof Islands, St. Lawrence Island, and western mainland Alaska (A.O.U. 1983). As many as 40 were on Shemya Island 16 May 1976 (Roberson 1980). Most records from this region are from spring (mid-May to early June) and fall (late July to mid-September), but the species has been recorded in summer (Armstrong 1990). The Long-toed Stint's occurrence in Alaska coincides with the known spring and fall migration timing of the species (Cramp and Simmons 1983). The only previous records for continental North America outside of Alaska (see DeSante and Pyle 1986) are two birds reported from Oregon: a juvenile at the south jetty of the Columbia River 2-6 September 1981 (Gilligan et al. 1987) and an adult in alternate plumage there 17 July 1983 (Schmidt 1989). An earlier report from Oregon and one from British Columbia are generally regarded as misidentified Least Sandpipers (Roberson 1980, A.O.U. 1983, Godfrey 1986).

Figure 3. Long-toed Stint, Salinas sewage ponds, 29 August 1988. This angle clearly shows the bold mantle stripes and the sharp contrast between the crown and the nape.

Photo by Peter La Tourrette

IDENTIFICATION SUMMARY

Both the Long-toed Stint and the Least Sandpiper are very small with medium-long yellowish legs (but see Carey 1987) and medium-long black bills that are slightly decurved and pointed at the tip. They are very similar to one another and field separation can be difficult. Consistent differences in shape, bare-part coloration, measurements, and vocalizations are given in standard references such as Prater et al. (1977), Grant and Jonsson (1984), Hayman et al. (1986), and Veit and Jonsson (1987).

The Long-toed Stint and Least Sandpiper are much more similar in plumage than they are in shape. In juvenal plumage, each is characterized by whitish underparts with dark streaking at the sides of the breast, a rufous crown, a white throat and supercilium, grayish ear coverts, largely dark-centered feathers with rufous edgings on the upperparts, and whitish mantle stripes. However, subtle differences can be found in each of the characters mentioned here. Much has been said about the extent of streaking on the underparts and whether or not it crosses through the center of the breast. According to several sources (such as Wallace 1980), a typical Least shows a complete breast band of streaks on a buff wash whereas a typical Long-toed shows no streaking at the center of the breast and the ground color is whiter. Nevertheless, much overlap exists and this

Figure 4. Long-toed Stint, Salinas sewage ponds, 29 August 1988. Note how the streaking fades toward the center of the breast and extends down the flanks. A fairly distinct lateral crown stripe is apparent at this angle.

Photo by Peter La Tourrette

character cannot be used with complete confidence (Wilds 1988, Alström and Olsson 1989). A key difference exists in the wing coverts: on the Least, the wing coverts are edged with warm buff or rufous; on the Long-toed, the edgings are white or whitish-gray and broken at the tip. Thus, contrast between the wing coverts and the scapulars is significant on the Long-toed, whereas little or no contrast is present on the Least. The rufous fringe on the scapular feathers of the Long-toed is broken by black at the tip but completely encircles the tip on the Least.

The pattern on the face and head provides some of the best clues to specific identification. The supercilium of the Long-toed is usually whiter, especially above and in front of the eye. Often, the supercilium of the Long-toed extends past the auriculars to the back of the head, thus creating a more capped effect. However, the Least can show a supercilium nearly this long and the Long-toed can show one much shorter, so this mark should not be relied upon in the field. On Long-toed, the dark loral line appears to be split, as if formed by two spots that barely meet (Wilds 1988, Alström and Olsson 1989). The gap at the center forms a comma-shaped loral line, producing a bulbous white "drop" between the eye and the bill. This effect is further accentuated by the dark forehead of Long-toed, which extends down from the crown to meet the base of the culmen and to connect with the loral stripe. The Least has a thicker loral line that shows no sign of being split. Also, the anterior portion of the supercilia usually meet over the bill, creating a white area on the forehead at the base of the culmen. Bold whitish lateral crown stripes, forming a split supercilium, are often present on juvenile Long-toed Stint but usually absent or faint on the Least Sandpiper (Alström and Olsson 1989). The posterior edge of the auricular is usually whiter and less well defined on the Long-toed and the nape of a Long-toed is typically gray, unlike the faded buff of a Least. The nape color contributes to the more capped appearance of juvenile Long-toed Stint.

In alternate plumage, the supercilium is not nearly as bold as in juveniles and the white area before the eye is less clearly defined. A split supercilium is frequent in spring Long-toed, but is also rarely present in spring Least. The loral stripe tends to be wider in alternate-plumaged Long-toed but is still narrower than on a typical Least. Thus, the two species can closely resemble one another in alternate plumage, although the Long-toed Stint tends to be brighter overall and each species still shows a head pattern similar to that described for juveniles. Basic-plumaged birds of both species are brownish-gray above, with the Long-toed slightly darker. The pattern of the mantle feathers is distinctive. These feathers are black-centered and widely edged with brownish in the Long-toed. In the Least, the feathers are mostly brownish-gray with black shafts that blend diffusely into the surrounding feathers. Also, the differences in facial pattern are still evident.

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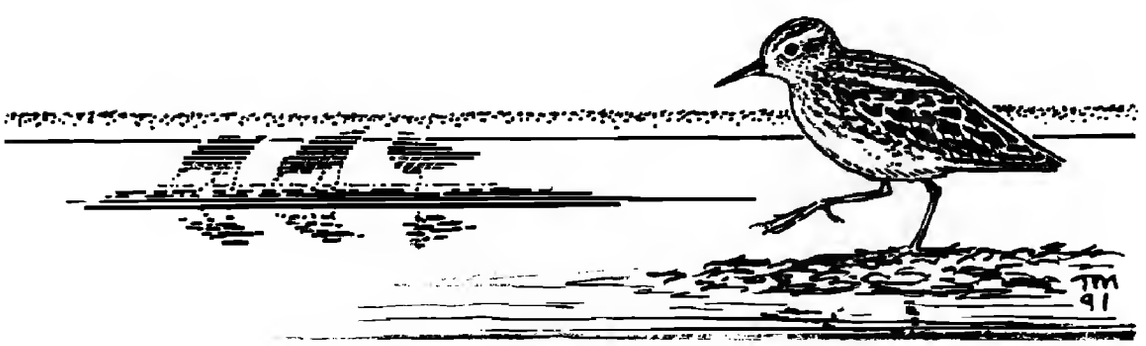

Long-Toed Stint *Sketch by Tim Manolis*

NOTES

FIRST RECORD OF A GARGANEY IN IDAHO

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At 1147 hrs, on 20 April 1990, at a distance of 50 to 75 m, I observed a male Garganey (*Anas querquedula*) on the Snake River, approximately 15 km west of Hammett, Idaho, 200 m east of the Flying "H" irrigation pump station. I watched the bird for about 2.5 minutes. The Garganey was feeding within a floating bed of algae along the bank with a male and female Cinnamon Teal (*A. cyanoptera*). From 1815 to 1833 hrs on 2 May 1990, and again at 0800 on 3 May, I saw the bird at a distance of 20 to 40 m, feeding in a similar fashion with a male and female Cinnamon Teal, now 50 m west of the Flying "H" irrigation pump station on the north side of the river. At approximately 1600 hrs on the same day, D. M. Taylor and N. Cummings observed the male Garganey at this same location displaying the same feeding behavior.

The male Garganey was identified by the white head stripe starting above and in front of the eye, following a line parallel to the crown ending at the nape, and by the five long white wing feathers outlined in black. These feathers extended over the leading edge of the folded wing and down along side the body. The Garganey was also similar in size to the Cinnamon Teal with which it was seen.

Observations were made with a 40-power Nikon spotting scope and 7 × 50 Bushnell binoculars. I photographed the bird with 80-210 mm zoom and 500 mm lenses on a Pentax ME Super camera with Kodachrome 64 film (Figure 1).

Since all of sightings were made while the bird was in the water, no leg bands were observed. There appeared to be little wear on the plumage. I spoke with three area residents, none of whom knew of any Garganeys raised by aviculturists.

These observations were accepted by the Idaho Bird Records Committee for the first record of a Garganey in Idaho. My three observations of the Garganey foraging with a pair of Cinnamon Teal not only reinforces Kaufman's suggestion of an influx of this species during the 1989 fall migration, but is in concert with other male Garganeys sighted with Blue-winged (*A. discors*) or Cinnamon Teal (Spear et al. 1988). In the spring of 1990, Garganeys were also sighted in California, Colorado, Alberta, Saskatchewan, North Dakota, Virginia, Quebec, New Brunswick, and on Prince Edward Island (Kaufman 1990). Many of these birds may have previously overshot their breeding grounds in Europe or Africa, or were misoriented in their migration and ended up in Central and South America. The Garganey I observed could have arrived in this manner or via Pacific routes, pushed off its traditional course by eastward movements of storms (Spear et al. 1988).

Figure 1. Male Garganey observed in April and May 1990 on the Snake River in southwestern Idaho.

Photo by Scott Grothe

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PREDATION BY FERAL CATS ON BIRDS AT ISLA SOCORRO, MEXICO

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Socorro Island, the largest and biologically most diverse of the four islands of the Revillagigedo Archipelago (Brattstrom 1990), confronts serious problems related to human activities. Eight endemic taxa of land birds now breed on Socorro: Yellow-crowned Night Heron, *Nyctanassa violacea gravirostris*; Socorro Red-tailed Hawk, *Buteo jamaicensis socorronensis*; Socorro Ground Dove, *Columbina passerina socorroensis*; Green Parakeet, *Aratinga holochlora brevipes*; Socorro Wren, *Thryomanes sissonii*; Socorro Mockingbird, *Mimodes graysoni*; Tropical Parula Warbler, *Parula pitiayumi graysoni*; and Socorro Towhee, *Pipilo erythrophtalmus socorroensis* (McLellan 1926, Jehl and Parkes 1982, Brattstrom 1990). Jehl and Parkes (1983) have proposed that domestic cats (*Felis catus*), introduced since 1957, are responsible for the extirpation of the endemic Socorro Dove, *Zenaida graysoni*, and reductions of other species, especially the Socorro Mockingbird. However, no quantitative data on predation by feral cats on Socorro Island have been previously reported in the literature. We present here an analysis of the diet of feral cats on Socorro Island.

Socorro Island, located approximately 450 km south of the tip of the peninsula of Baja California, covers about 14,000 hectares (16 × 11 km). This island is a volcanic cone whose highest point is Mount Evermann (1050 m). Climate is arid tropical with an average annual temperature of 24.8° C and average annual precipitation of 327.7 mm. Fresh water is found in the puddles formed after tropical storms and continuously in several caves.

From 16 to 28 February and from 7 to 12 May 1990 we conducted our field research on Socorro Island, intensively searching for scats, tracks, and other indirect evidence of feral cats, specially in the south portion of the island. We searched in *Croton* scrub (40 m elevation), disturbed grassland, and forest (650 m elevation). Presumably, the scats we found were from different individuals, as they were widely dispersed.

We found and analyzed 31 scats, comparing the remains of scales, bones, feathers, and hairs with those of the collection of Centro de Investigaciones Biológicas. Table 1 shows the occurrence of items in 31 scats found during February and May 1990. Feral cats were feeding mainly on House Mice (*Mus musculus*), endemic lizards (*Urosaurus auriculatus*), some birds, and also crabs, insects, scorpions, and various vegetable materials (Table 1). Birds were present in 22.6% of the cat scats (February and May samples combined). The Socorro Ground Dove and Tropical Parula Warbler were the two bird species found most often in the scats, five and three times, respectively. A recent colonizer, the Mourning Dove (*Zenaida macroura*), was present in two of the 31 analyzed scats. Although we did not find remains of another recent colonizer, the Northern Mockingbird (*Mimus polyglottus*), in May we found feathers of one in the field, presumably eaten by a feral cat. Jehl and Parkes (1982) reported predation by cats on Townsend's Shearwater (*Puffinus auricularis*), but we did not find evidence of this perhaps because our searches were not made near the shearwater colonies.

Our results suggest that predation on birds by feral cats is not very important. However, even limited predation may seriously affect a species as endangered as the Socorro Mockingbird. This species' population may be approximately 60–70 pairs (Castellanos and Rodriguez-Estrella 1990, L. Baptista pers. comm.), and we found evidence that it is preyed upon by Socorro Red-tailed Hawks (a Socorro Mockingbird

Table 1 Prey Remains Identified in 31 Scats of Feral Cats on Socorro Island, 1990

	February (12 samples)		May (19 samples)	
Prey	*N*[a]	%	*N*	%
Mammals	11	91.7	17	89.5
Mus musculus	9	75.0	17	89.5
Felis catus	2	16.7	0	0.0
Birds	3	25.0	4	21.1
Columbina	2	16.7	3	15.8
Thryomanes	1	8.3	1	5.3
Parula	2	16.7	1	5.3
Mimodes	1	8.3	0	0.0
Zenaida macroura	0	0.0	2	10.5
Reptiles	4	33.3	10	52.6
Urosaurus auriculatus	4	33.3	10	52.6
Invertebrates	9	75.0	14	73.7
Orthoptera	8	66.7	12	63.2
Lepidoptera	2	16.7	0	0.0
Coleoptera	2	16.7	4	21.1
Hymenoptera	1	8.3	1	5.3
Scorpiones	0	0.0	4	21.1
Decapoda	0	0.0	2	10.5
Miscellaneous	9	75.0	17	89.5
Seeds	1	8.3	4	21.1
Vegetable fibers	8	66.7	14	73.7
Unidentified animal matter	0	0.0	2	10.5

[a]Number of scats in which each species or item was identified.

wing and feathers showing predation by a hawk) and cats. The endemic Red-tailed Hawk and Socorro Mockingbird have presumably long been in predatory–prey equilibrium, while cats are of recent introduction. "Alien predation" (Moors and Atkinson 1984) by cats may be a serious problem because it could lead to declines in some bird species, as has happened with other island landbirds and seabirds (Jehl 1972, Taylor 1979, Diamond 1982, Moors and Atkinson 1984, Fitzgerald and Veitch 1985, Veitch 1985, Ebenhard 1988).

The population of feral cats seems to be densest in the southeast portion of the island apparently because this area is the zone most perturbed by human activities. Here water and domestic garbage are available for cats, and the food supply in human refuse may favor an increase of the cats' population. The actual numbers of cats is hard to determine, although their distribution on the island is increasing (Arnaud et al. unpubl. data). Because feral cats take their prey mainly on the ground, birds foraging on the ground, such as the endemic ground dove and wren, are especially vulnerable. The Socorro Wren population is very dense, but such is not the case for Socorro Ground Dove, which is still fairly common in the open lowlands of the island, especially in the southeast and eastern portions near the coast (W. Wehtje pers. comm.). This species is no longer as tame as reported by Villa (1960)—"son mansas y se les captura simplemente con las manos"—but it seems that their foraging and reproductive activities are normal. However, whenever we approached

the ground doves, they immediately flew, suggesting that predation by cats is affecting the endemic dove's tameness and possibly its population size.

At the Centro de Investigaciones Biológicas we are studying the process of apparent extinction of some bird species, and we want to call the attention of the scientific community and organizations concerned with the conservation of biodiversity about the need to eradicate the feral cats from Socorro Island and thereby protect the endemic avifauna. Otherwise, cats may put in risk some of the land birds of the island, particularly the Socorro Mockingbird.

Special thanks are due to Alfredo Ortega for encouraging our studies on Socorro Island. Philip Unitt, William T. Everett, and an anonymous reviewer made helpful suggestions on a previous draft. Luis Baptista kindly provided us the information on the 19 Socorro Mockingbirds he recorded in the north-central part of the island in November 1990. For its support on the island we thank the Mexican Navy. Economic support was provided by World Wildlife Fund, the Centro de Investigaciones Biológicas, Consejo Nacional de Ciencia y Tecnología, Secretaría de Programación y Preseupuesto, Secretaría de Desarrollo Urbano y Ecología, and Fundación Ricardo J. Zevada.

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PRESIDENT'S MESSAGE

You may have noticed that issues of *Western Birds* have recently been appearing quite frequently. WFO hopes and expects that all issues of Volume 22 will appear during 1991, so that the journal will be caught up by the end of the year. Then from 1992 and Volume 23 onward, four issues will come out in the correct calendar year. This also means that the renewal notices for Volume 23 will be sent out in early 1992. Please renew promptly even though it will be less than a year since you last renewed.

At its meeting in Bend, Oregon, in June 1991 the WFO board decided that Volume 23 would be the last for which the life membership is $250. Life membership will be raised to $350 for Volume 24 in 1993. If you are thinking of becoming a life member, this is the time to "just do it." Also remember that you can pay in up to four equal installments. WFO has several new life members since the list published on page 142 of Vol. 21, No. 3. They are

Dr. William A. Carter	Oklahoma
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Dr. Peter R. Gent	Colorado
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Clarann Levakis	California
Dr. Eugene I. Majerowicz	California
John T. McBride Jr.	Louisiana
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Dr. Evelyn B. Myers	California
Dr. Peder H. Svingen	Minnesota
Carl G. Thelander	California

In addition, the following members have paid their first installment:

Douglas W. Aguillard	California
Dr. David G. Seay	California

Contributors to *Western Birds* please note that editor Philip Unitt will be out of the country from approximately 10 November to 31 December 1991. During his absence, please send correspondence to associate editor Tim Manolis, 808 El Encino Way, Sacramento, CA 95864.

Finally, the date of the WFO Seventeenth Annual Meeting has been set. The meeting will be held on the weekend of 18–20 September 1992 at the San Francisco Bay Bird Observatory, Alviso, California. It will be hosted by executive director Don Starks and other members of the observatory. They can be contacted at (408) 946-6548. I hope to see you all there.

Peter Gent

Volume 22, Number 3, 1991

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Cover photo © by Lawrence Sansone of Los Angeles, California: Long-toed Stint (*Calidris subminuta*), Salinas sewage ponds, California. 31 August 1988.

Western Birds solicits papers that are both useful to and understandable by amateur field ornithologists and also contribute significantly to scientific literature. The journal welcomes contributions from both professionals and amateurs. Appropriate topics include distribution, migration, status, identification, geographic variation, conservation, behavior, ecology, population dynamics, habitat requirements, the effects of pollution, and techniques for censusing, sound recording, and photographing birds in the field. Papers of general interest will be considered regardless of their geographic origin, but particularly desired are reports of studies done in or bearing on the Rocky Mountain and Pacific states and provinces, including Alaska and Hawaii, western Texas, northwestern Mexico, and the northeastern Pacific Ocean.

Send manuscripts to Philip Unitt, 3411 Felton Street, San Diego, CA 92104. For matter of style consult the *Suggestions to Contributors to Western Birds* (8 pages available at no cost from the editor) and the *Council of Biology Editors Style Manual* (available for $24 from the Council of Biology Editors, Inc., 9650 Rockville Pike, Bethesda, MD 20814).

Reprints can be ordered at author's expense from the Editor when proof is returned or earlier.

Good photographs of rare and unusual birds, unaccompanied by an article but with caption including species, date, locality and other pertinent information, are wanted for publication in *Western Birds*. Submit photos and captions to Photo Editor.

WESTERN BIRDS

Vol. 22, No. 4, 1991

WESTERN BIRDS

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WESTERN BIRDS

Volume 22, Number 4, 1991

LONG-DISTANCE VAGRANCY OF THE ASIATIC MARBLED MURRELET IN NORTH AMERICA, 1979–1989

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Long-distance vagrancy is common in seabirds, particularly among the petrels of the order Procellariiformes (Bourne 1967). Records of such vagrancy in the Alcidae also are numerous and have involved many species (e.g., Bent 1919, Grinnell 1938, Porsild 1943, Salomonsen 1944, Munyer 1965, Nero 1968, Sealy et al. 1971, Roberson 1980, Pitman et al. 1983). The nominate subspecies of the Marbled Murrelet (*Brachyramphus marmoratus marmoratus*) regularly occurs inland up to 75 km from the Pacific Ocean on the west coast of North America (Carter and Sealy 1986), but these occurrences represent normal use of its inland nesting areas. Long-distance vagrancy in this species was not detected until 1979, but, over the next 10 years, 10 specimens of the Asiatic subspecies (*B. m. perdix*) were taken and three other Marbled Murrelets were observed at widespread localities across North America. Four specimen records have been published (Jehl and Jehl 1981, Mumford 1982, Sealy et al. 1982, Hoffman and Woolfenden 1988). In this paper, we document six other inland occurrences of *B. m. perdix* and examine all records to attempt to explain the occurrence of these Asian birds in North America.

Table 1 Measurements (mm) and Body Mass of Asiatic Marbled Murrelets (*Brachyramphus marmoratus perdix*) from Inland North America, 1979–1986

Record No.	Location	Date found	Body mass (grams)	Exposed culmen	Bill height	Flattened wing	Tarsus	Tail
1	Quebec	Nov 79	285.9	21.9	6.7	148.5	18.5	32.6
2	California[a]	Aug 81	204	22.3	6.4	146.0	17.9	33.4
3	Indiana	Dec 81	303.8	20.3	6.2	138.0	17.3	32.1
4	Colorado	Aug 82	206	19.9	6.8	136.2	17.9	32.4
5	Massachusetts	Sep 82	184.2	21.2	6.5	142.8	18.1	35.0
6	California[a]	Jul 83	—	—	—	139.0	18.8	—
7	California[a]	Aug 83	198.3	19.9	6.4	144.1	16.4	33.0
8	California[a]	Aug 83	—	20.1	—	140.2	—	—
9	Alaska	Aug 83	—	21.4	6.2	139.5	16.6	—
10	Florida	Dec 86	199.4	21.6	6.7	147.3	18.5	37.7

[a]All birds were recovered at Mono Lake, Mono Co.

METHODS

The 10 specimens reported in this paper were examined and measured by Sealy. All but one were referred to the larger subspecies, *B. m. perdix*, because their exposed culmens exceeded 18 mm (Table 1); bills of *B. m. marmoratus* are shorter than this (Sealy et al. 1982). One specimen lacked its head and was identified as *B. m. perdix* on the basis of other measurements (see below). The specimens have been deposited in the following ornithological collections: Denver Museum of Natural History (DMNH); Museum of Vertebrate Zoology, University of California, Berkeley (MVZ); National Museum of Canada, Ottawa (NMC); San Diego Natural History Museum (SDNHM); University of Alaska Museum, Fairbanks (UAM); University of Michigan Museum of Zoology, Ann Arbor (UMMZ); University of South Florida, Tampa (USF); and United States National Museum, Washington, D.C. (USNM). Other details regarding the handling and subspecific identification of the specimens and the examination of comparative material have been given by Sealy et al. (1982).

ANNOTATED LIST OF RECORDS

Definite Records

1. An after-hatching-year (AHY; i.e., adult or subadult but not juvenile) male (NMC 69,845) in nearly complete basic plumage was shot on 11 November 1979 just north of Montreal, Quebec (David and Gosselin 1980, Sealy et al. 1982). It was molting extensively on the body, but its wing molt was nearly complete with the tenth primary only partly sheathed, and all of its secondaries were new.

Sealy et al. (1982) reported another specimen of *B. m. perdix* allegedly taken in Montreal, Quebec, on 13 April 1913, but we now consider this collecting locality an error. This specimen was originally reported as an Ancient Murrelet (*Synthliboramphus antiquus*), but without any details (Lewis 1924). Our efforts to track down this specimen, which allegedly was housed in the museum of Laval University, Quebec City, when Lewis (1924) examined it, led us to believe it to be a mounted specimen of *B. m. perdix* in the Musée du Petit Seminaire de Québec (MPSQ 603, Quebec City). However, M. Gosselin (in litt., 4 February 1983) pointed out to Sealy an editorial notice (Huard 1913) in which the alleged Ancient Murrelet from Montreal was originally documented and called "Mergule à gorge noire, Ancient Murrelet." According to Gosselin, the French name means "black-throated Dovekie (*Alle alle*)" suggesting an Ancient Murrelet, especially one taken in April when chins and throats are black even on yearling individuals (Sealy and Carter, unpubl. data). Contrarily, MPSQ 603 has a white throat. Gosselin further pointed out that other specimens of Marbled Murrelets are housed presently in MPSQ, and a mounted specimen of an Ancient Murrelet taken in Japan in 1915 is housed in the Musée du Seminaire de Sherbrooke. Thus, it seems probable that MPSQ 603 was also taken in Japan and not in Quebec.

2. An AHY male in complete alternate plumage (SDNHM 41,544) was found dead on 9 August 1981 on the shore of Mono Lake, Mono Co., California (Jehl and Jehl 1981).

3. An unsexed, AHY bird (USNM 582,506) in basic plumage with wing molt complete but body molt incomplete was found shot on 1 December 1981 on Lake Lemon, Monroe Co., Indiana (Mumford 1982, Peterjohn 1982a,b, Sealy et al. 1982).

4. On 22 August 1982, an AHY male (DMNH 37,691) in alternate plumage was found on a rural road about 8 km from Aspen, Pitkin Co., Colorado, and released on Hallam Lake in Aspen by T. Cardamone. The bird was dead the next day (see Kingery 1983). It lacked subcutaneous fat. Its remiges were old and worn, but the primary and secondary coverts were new, suggesting that the bird was a yearling.

5. An AHY female (ovary granular, 5 × 16 mm) in mostly alternate plumage (USNM 599,498) was taken possibly alive by a domestic cat on 17 September 1982 in swampland near Middleboro, Plymouth Co., Massachusetts (see Forster 1983). The bird was molting lightly on the chin, throat, back, and rump; all but three of its rectrices were gone. Primaries 1–3 were being replaced (still sheathed), primaries 4–6 were missing, and primaries 7–10 were old and extremely worn. The secondaries were worn and old. This is the normal primary molt sequence for Marbled Murrelets during the early stages of wing molt. This individual probably was flightless when found, suggesting that it had been in or near the area of its capture probably for at least one week.

6. On 29 July 1983, E. Strauss and W. D. Shuford found a decomposed, partially mummified, unsexed, and headless AHY murrelet (UMMZ 224,651) in alternate plumage (the remiges were worn) on the shore of Mono Lake, Mono Co., California. We tentatively identified this specimen as *B. m. perdix* by its very large tarsus and large flattened wing length (see Sealy et al. 1982).

7. On 2 August 1983, E. Strauss and M. Kozak found a recently dead AHY male (MVZ 169,134) in alternate plumage, with left testis 2.5 × 11.0 mm, on the shore of Mono Lake, Mono Co., California (see Figure 1). This emaciated individual's stomach was empty and its remiges were worn, but it was not molting.

8. An AHY bird in alternate plumage was found by W. D. Shuford on 6 August 1983 on the shore of Mono Lake, Mono Co., California. Its skull, wings (with worn remiges), and one leg were salvaged from the recently dead, unsexed specimen (UMMZ 224,652).

9. On 27 August 1983, G. S. Lester found a partial carcass of *B. m. perdix* (UAM 5,302) at Railroad Lake (63° 43' N, 148° 55' W) in Denali National Park, Alaska. The unsexed AHY bird was recently dead, in alternate plumage, not molting, and its remiges appeared to be only slightly worn.

10. An AHY female in essentially complete basic plumage was found dead on a beach on Honeymoon Island, Pinellas Co., Florida, on 27 December 1986 (Ogden 1987, Hoffman and Woolfenden 1988). It was emaciated and had died recently.

Probable Records

We presume that these birds belonged to the Asiatic subspecies, *B. m. perdix*, from the vast distance of these records from the Pacific Ocean. Not one specimen of the nominate subspecies *B. m. marmoratus* has been secured more than 75 km inland (Carter and Sealy 1986).

11. An unaged and presumably basic-plumaged Marbled Murrelet was observed alive at Lake Michigan between Long Beach and Michigan City, Indiana, on 2 December 1984 (Peterjohn 1985).

12. An AHY Marbled Murrelet in alternate plumage was observed alive on the Atlantic Ocean off Little Codroy River, Newfoundland, on 15 July 1989 (MacTavish 1989).

13. One Marbled Murrelet was observed alive at Cypress Lake, Saskatchewan, on 22 October 1989 (Koes and Taylor 1990).

EXPLANATION FOR VAGRANCY

Attempts to explain long-distance vagrancy such as that exhibited by murrelets are speculative. Most explanations link vagrancy to meteorological events, often unsuccessfully (Elkins 1983). Nevertheless, weather patterns have been invoked to explain several recent records of birds, many of Siberian origin, in North America and the Atlantic Ocean (e.g., Evens and LeValley 1981, Amos and Wingate 1983, Pyle et al. 1983, Wingate 1983).

Figure 1. Male Asiatic Marbled Murrelet (MVZ 169,134) found on 2 August 1983 on shore of Mono Lake, Mono Co., California.

The regular occurrences of Ancient Murrelets inland in North America since the 1880s have been associated with storms that moved inland from the Gulf of Alaska, mainly in late fall (Munyer 1965, Verbeek 1966, Sealy and Carter 1980). Similarly, long-distance vagrancy, including inland occurrences, of Dovekies has been associated with storms (Sprunt 1938) that moved inland from the Atlantic Ocean (Murphy and Vogt 1933, Snyder 1953). Considering inland records of vagrant petrels, tropicbirds, frigatebirds, and terns, Wingate and Watson (1974) suggested that seabirds "may occasionally soar to great heights and get blown far inland over continents, especially in overcast or stormy conditions." Nevertheless, these authors did not obtain a simple meteorological explanation of a record of the Pacific subspecies of the White Tern (*Gygis alba candida*) in Bermuda.

The 13 records of Asiatic Marbled Murrelets in North America fall into two periods, late July through early September and late October through December. The first period coincides with the early post-breeding period (Kuzyakin 1963, Sealy 1974, Sealy et al. 1982) when many birds are probably dispersing before becoming flightless during the prebasic molt (Sealy 1975, Carter 1984). Marbled Murrelets in Asia generally breed in regions that experience more severe winters than do murrelets in North America and tend to migrate south (Sealy et al. 1982). Vagrancy from July to September would account for the presence of birds in alternate plumage in Alaska, California, Colorado, and Newfoundland, as well as the Massachusetts individual that presumably started molting after it arrived in North America. However, some Marbled Murrelets molt at breeding areas before moving later in the fall (Carter 1984). Late fall birds (Quebec, Indiana, Florida, Saskatchewan) probably molted in Asia, shortly before their long journey. In fact, the Quebec and Indiana birds had not quite completed molting when recovered in North America.

Eastward trans-Pacific vagrancy may be tied to anomalous weather conditions at the time of southward migrations of Marbled Murrelets in Asia. Since 1976, the Aleutian–Gulf of Alaska Low pressure system has intensified during winter and was especially strong during the 1982–1983 El Niño–Southern Oscillation (Namias and Cayan 1984, Rasmusson 1984, McLain et al. 1985). This is part of the development of the Pacific–North American weather pattern in which the Aleutian–Gulf of Alaska Low pressure system extends from the western Bering Sea over western Alaska to much of the eastern North Pacific Ocean above the Tropic of Cancer (see Figure 2). These conditions favor strong westerly winds and associated storms that could carry individual murrelets to North America from their breeding range in Kamchatka and the Sea of Okhotsk (as summarized by Sealy et al. 1982).

While this mechanism for and timing of long-distance vagrancy may explain how Asiatic Marbled Murrelets arrived in North America, it does not explain fully why they were recorded only between 1979 and 1986. El Niño or other conditions that promote vagrancy may have prevailed earlier in the year than at other times in the past century and coincided with the southerly post-breeding dispersal of murrelets in Asia. Between April and August 1982, atmospheric anomalies at the equator in the western Pacific

began abruptly and were especially pronounced during the atypical 1982–1983 El Niño and probably were connected to weather anomalies farther north at this time (Philander 1983, Rasmusson and Wallace 1983, Harrison and Cane 1984, Rasmusson 1984). Between July and September 1982, two murrelets were found in North America. Typically, El Niño begins earlier in the year and in the eastern Pacific. The 1982–1983 El Niño began to decay in the western Pacific by May 1983 but was prolonged in the eastern Pacific, not ending until October 1983. But in July and August 1983, four more murrelets were found in North America. It appears that six *B. m. perdix* found in North America were temporally linked to this single El Niño. Changes in seabird distributions were also noted elsewhere in the Pacific during this El Niño; for instance, warm-water species moved farther

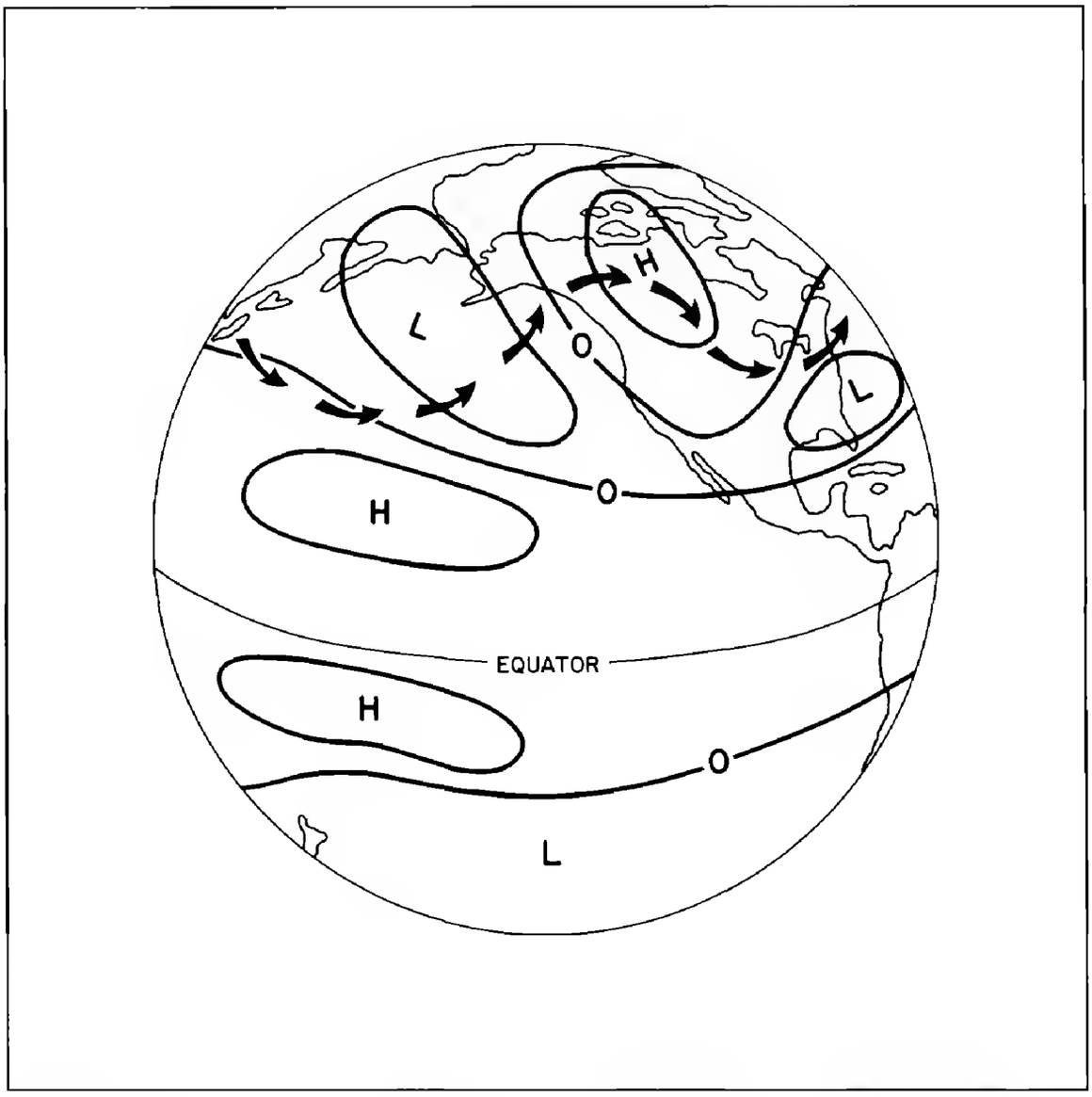

Figure 2. Anomalous pressure pattern in the upper troposphere during El Niño–Southern Oscillation conditions. Arrows indicate how streamlines for airflow in the upper atmosphere are affected. Anomalies in the upper troposphere reflect surface pressure anomalies (from Philander 1983).

north while cool-water species were less abundant in California waters and more abundant in central subarctic waters (Ainley et al. 1988).

Upon reaching North America, the birds could be carried inland by continued wind and storms, especially at higher elevations [see Vickery (1980) for records of hurricane-driven Sooty (*S. fuscata*) and Bridled (*S. anaethetus*) terns as far north as Maine and New Hampshire, respectively]. Once birds are inland, winds can swing them onto a northwest to southeast diagonal across northern North America from British Columbia to below the Great Lakes and then to the northeast at mid-continent (see Figure 2). This occurs as a continuation of the Pacific–North American weather pattern, driven by a high-pressure ridge over western Canada and a low-pressure ridge over the southeastern United States. Many records roughly fall on this general path. Similarly, inland occurrences of vagrant Ancient Murrelets also follow this pattern (Sealy and Carter 1980). During the fall of 1982, the continued movement of westerly winds and associated storms from the North Pacific and across the continent were especially evident and may have accounted for the Colorado and Massachusetts occurrences. Similar but less understood conditions in late fall, possibly in relation to changes in the Aleutian–Gulf of Alaska Low pressure system since 1976, may account for the far-inland birds in Quebec and Indiana in 1979 and 1981, respectively, and may be related to oceanic conditions that could have prompted more southerly movements of Marbled and Ancient murrelets along the west coast of North America during the winter of 1979–1980 (Garrett and Dunn 1981). McCaskie (1980) noted that the southernmost previous records of Marbled Murrelets were in 1886, 1910, and 1958. Each of these years corresponded to strong-to-moderate El Niño conditions in 1884–1887, 1911, and 1957–1959, respectively (Rasmusson 1984). The December 1986 Florida bird may have been associated with a weak El Niño earlier that year.

In conclusion, we believe that anamolous weather patterns since 1976, especially El Niño and changes in the Aleutian–Gulf of Alaska Low pressure system, provide a tentative explanation for long-distance vagrancy in the Asiatic Marbled Murrelet. Our examination of storm tracks associated with each vagrant's occurrence did not provide any more direct support for this explanation. Strong individual storm tracks rarely travel the entire distance from eastern Asia to western North America, let alone across North America (e.g., Wilson 1984). We presume that storm-driven vagrants could travel along several storm-track routes, modified by varying amounts of self propulsion.

SUMMARY

Ten specimens of the Asiatic Marbled Murrelet (*Brachyramphus marmoratus perdix*) and three other observations of probable Asiatic Marbled Murrelets were obtained at widely scattered locations across North America between 1979 and 1989. These occurrences were linked to anomalous weather patterns related to El Niño and the Aleutian–Gulf of Alaska Low pressure system, especially during the July 1982 to August 1983 El Niño period, for which there are six records for North America.

ACKNOWLEDGMENTS

We again thank the people, museums, other institutions, and agencies that provided funding and which were acknowledged by Sealy et al. (1982). The three *B. m. perdix* specimens found in California in 1983 were salvaged by personnel of the Point Reyes Bird Observatory during studies of the ecology of California Gulls at Mono Lake. D. D. Gibson, University of Alaska Biology Museum, kindly loaned us the specimen taken in Alaska in 1983. D. G. Ainley provided literature and commented on the effects of El Niño on Pacific weather patterns. M. Gosselin provided additional information on specimens of murrelets housed in museums in Quebec. P. Gent (National Center for Atmospheric Research), R. Gill, C. J. Ralph, P. Unitt, and an anonymous reviewer provided valuable comments on various drafts. This paper is contribution no. 343 of the Point Reyes Bird Observatory.

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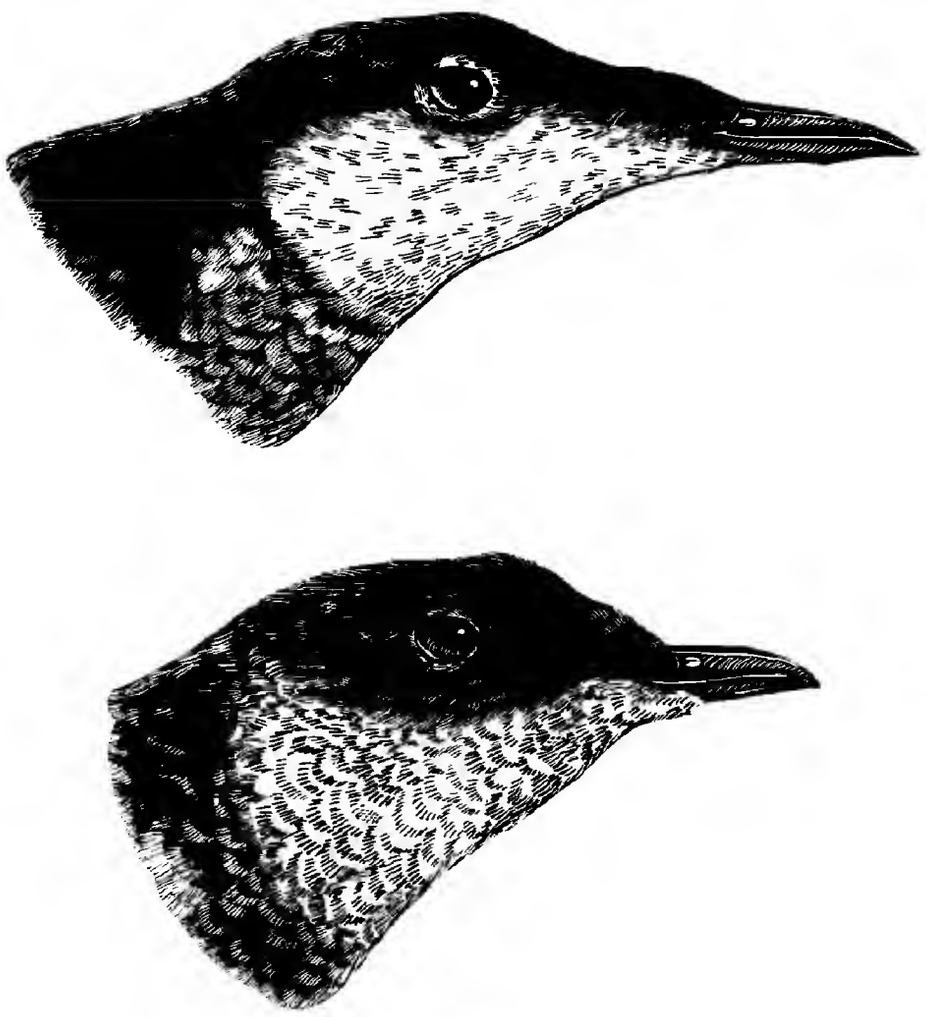

Two subspecies of the Marbled Murrelet (*Brachyramphus marmoratus*). Upper, Asiatic race, *B. m. perdix* (9 August 1981, Mono Lake, Mono County, California, San Diego Natural History Museum 41544). Lower, North American race, *B. m. marmoratus* (26 August 1933, Depoe Bay, Lincoln County, Oregon, SDNHM 21791). Note the difference in size and shape of the bill.

Sketch by Callie Mack

SEASONAL ABUNDANCE, HABITAT USE, AND DIET OF SHOREBIRDS IN ELKHORN SLOUGH, CALIFORNIA

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Large numbers of migrant and resident shorebirds feed and roost along the open coast, bays, sloughs, and marshes of California. However, more than 70% of coastal wetlands in California have been degraded by diking, filling, pollution, and other human activities (Speth 1979). Elkhorn Slough is one of the largest remaining salt marshes in California available to migratory shorebirds using the Pacific Flyway. Identification and conservation of critical habitats are required for an understanding of shorebird ecology and effective management of our resources (Senner and Howe 1984). Habitat use and foraging behavior vary from site to site (Baker and Baker 1973, Connors et al. 1979, Page et al. 1979), determined partially by the seasonal concurrence of shorebird movements and reproductive status, and habitat availability and preference. Abiotic factors (e.g., wind, tide, and temperature), as well as bird size and morphology, also influence distribution and behavior of shorebirds (Burger et al. 1977, Burger 1984).

Although some general patterns of shorebird distribution along the California coast are well documented (Jurek 1974, Shuford et al. 1989), trends in shorebirds' seasonal abundance and use of Elkhorn Slough wetlands are relatively unknown. Browning (1972) listed species, months of peak abundance, and maximum numbers of shorebirds in the slough. Seasonal occurrence and relative abundance of shorebirds in Elkhorn Slough were included in a broad census of California's wetland system, although observations were spatially and temporally limited (Jurek 1974).

Our objectives in this study were to describe the seasonal patterns in species composition and abundance of shorebirds in Elkhorn Slough, and to identify components of the ecosystem that support this assemblage. Use of habitat (intertidal mudflats, salt pond, and salt marsh) and feeding ecology of selected species were assessed.

Since 1983, more than 130 ha of diked wetlands have been returned to tidal action on the Elkhorn Slough National Estuarine Research Reserve. The salt ponds adjacent to the slough were exposed to tidal action in 1984. The present study, therefore, provides baseline information necessary for long-term monitoring of shorebirds in these newly restored marsh habitats.

STUDY AREA AND METHODS

Elkhorn Slough is a shallow tidal embayment and seasonal estuary on Monterey Bay (Figure 1), located about 160 km south of San Francisco,

California. The slough has an axial length of 10 km and maximum width of 100 m at its mouth. The main channel is bordered by mudflats and is intersected by several small tidal creeks. Grain size of intertidal sediment decreases progressively from the mouth (82% sand particles >64 μm; 18% silt) to the most inland areas of the slough (67% clay and 33% silt; C. Jong, Univ. California, Santa Cruz, unpubl. data). During this study, water depth in the main channel below mean lower low water (MLLW) was 5 m at the

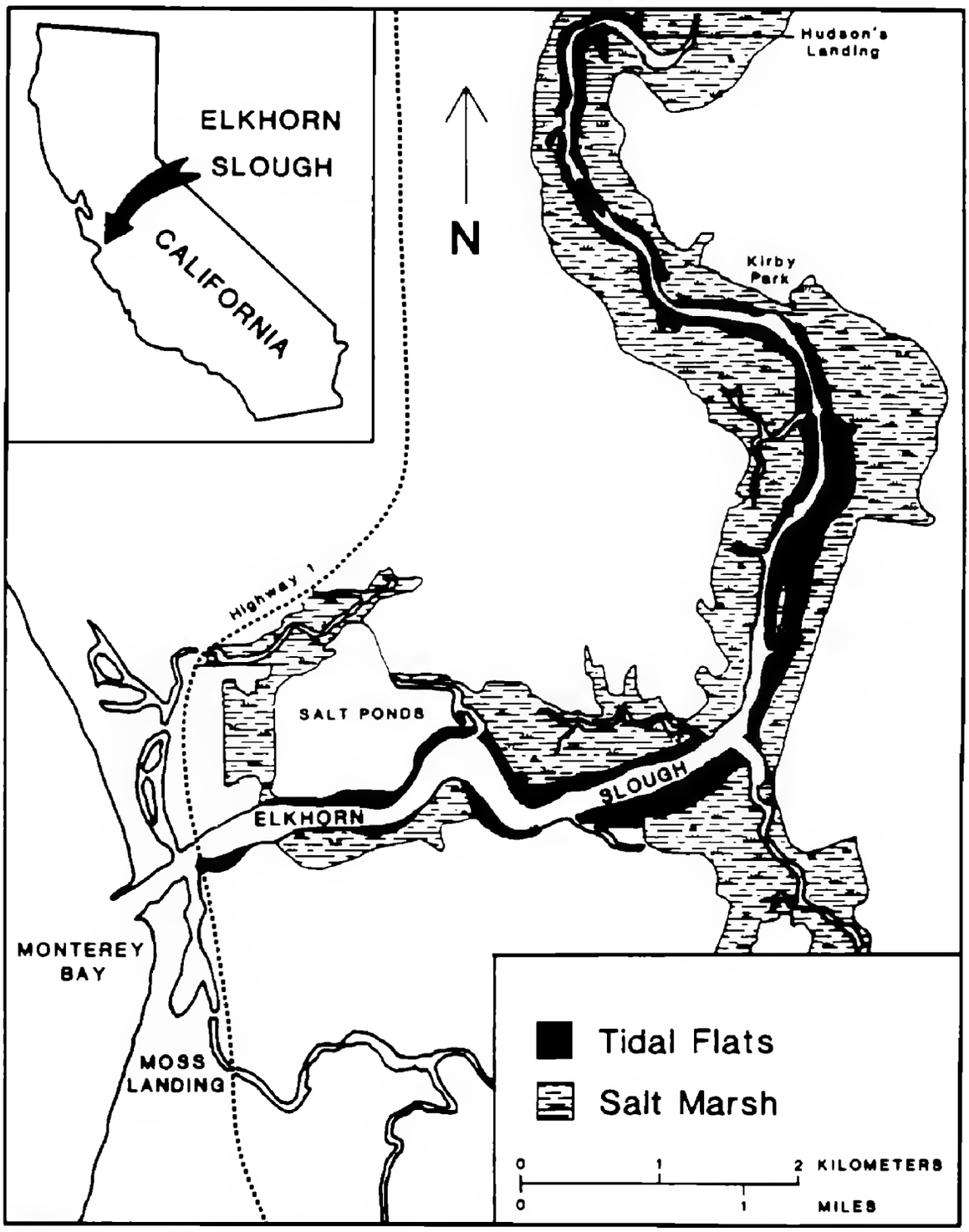


Figure 1. Shorebird survey area of Elkhorn Slough, indicating intertidal mudflats, salt marsh, and salt ponds.

mouth and <1 m at the most inland station; the mean tidal range was 1.1 m (Smith 1973, Broenkow 1977). About 170 ha of intertidal mudflats are exposed at MLLW (Browning 1972). Diked evaporating salt ponds (77 ha) are adjacent to Elkhorn Slough (Figure 1). An extensive salt marsh (583 ha) is located primarily on the northwest edge of the slough, and pickleweed (*Salicornia virginica*) is the dominant plant cover.

Surveys

We conducted our most intensive shorebird surveys from 1 November 1977 to 27 February 1980, along the main channel of Elkhorn Slough from California State Highway 1 to Hudson's Landing (Figure 1). At low tide, shorebirds on each intertidal mudflat and in adjacent salt marsh were identified and counted by one to four observers. Surveys were conducted from a small boat and lasted 1–4 hours. The direction of the survey route along the main channel and the state of the tides varied during each survey. All surveys were conducted between +1.2 and −0.1 m, relative to MLLW; mudflats were exposed within this range but the extent of exposure varied; see Ramer (1985) for tidal conditions during each survey. To minimize error associated with movement of birds among areas, we excluded any large flocks that likely were counted earlier. Number of shorebirds was converted to biomass by multiplying by the average weight of each species (Page et al. 1979) . Because of limited time at low tide, not all species were counted during every survey; abundance of common species, however, was determined at least once a month. Number of surveys during the year, therefore, is different for each species. Only surveys that included counts of all common species were used to estimate total and seasonal abundance of shorebirds.

To assess temporal patterns in abundance of shorebirds, we defined seasons as fall (July–October), winter (November–February), and spring (March–June). Summer was identified as the period (usually June) between the lowest abundance in spring and the increase in numbers in fall.

Habitat Use

Salt Ponds. To document shorebird use of salt ponds (Figure 1), we conducted additional surveys during October and November 1978. Numbers of birds roosting and feeding at five ponds were recorded over 3 hours on each of 12 days. Observations focused on the most abundant species: Western Sandpiper (*Calidris mauri*), Least Sandpiper (*C. minutilla*), and Dunlin (*C. alpina*).

Salt Marshes. We estimated relative frequency of roosting and feeding on 9 and 26 March 1979 for 10 minutes at 1-hour intervals in each of 3 hours during high tide at seven stations throughout the marsh (Figure 1).

Diet

From November 1978 to December 1979, stomach contents of Western Sandpipers (N = 25), Willets (*Catoptrophorus semipalmatus*; N = 21), and Marbled Godwits (*Limosa fedoa*; N = 24) were collected, primarily at one mudflat along the main channel of the slough. These were the most

abundant species that represented a gradient in bill length and body size. Feeding birds were shot and stomachs were injected with 10% formalin in the field. Stomach contents of seven additional Western Sandpipers were collected by means of a stomach pump after feeding birds were trapped in a net in the salt ponds. Few prey items remained in the stomachs after pumping (Ramer 1985); this effective technique should be considered in place of sacrificing birds for future diet studies. All data on diet of Western Sandpipers were combined for analysis.

Prey parts were identified to the lowest possible taxon; number and relative volume (%) of each prey category in a stomach were estimated. Prey identification frequently was based on recognizable parts only, such as bivalve hinge fragments, amphipod uropods, and polychaete setae. A minimum prey number of 1 was assigned to taxon represented solely by parts (e.g., polychaete setae or pieces of algae). Prey categories in each stomach were ranked according to their index of relative importance (IRI; Pinkas et al. 1971), a function of relative frequency of occurrence (FO), relative number (N), and relative volume (V): $IRI = (N + V) \times (FO)$.

RESULTS

Seasonal Patterns

The most abundant shorebird species along the main channel of Elkhorn Slough were (in descending order) the Western Sandpiper, Dunlin, Least Sandpiper, dowitchers (Short-billed [*Limnodromus griseus*] and Long-billed [*L. scolopaceus*]), Marbled Godwit, American Avocet (*Recurvirostra americana*), Willet, Black-bellied Plover (*Pluvialis squatarola*), Long-billed Curlew (*Numenius americanus*), and Sanderling (*Calidris alba*). Other shorebirds occurred irregularly, and included a maximum of 46 Ruddy Turnstones (*Arenaria interpres*), 32 Semipalmated Plovers (*Charadrius semipalmatus*), 27 Whimbrels (*Numenius phaeopus*), 7 Greater Yellowlegs (*Tringa melanoleuca*), 6 Killdeers (*Charadrius vociferus*), 6 Red Knots (*Calidris canutus*), 3 Black-necked Stilts (*Himantopus mexicanus*), and 1 Lesser Yellowlegs (*Tringa flavipes*) per survey.

For the eight species common to each of 21 surveys along the main channel of Elkhorn Slough, total number increased during fall, from about 200 birds in June to 11,750 birds in November (Figure 2). From 6000 to 13,750 birds were counted during winter (the period of minimum migratory movement), and numbers decreased from spring to summer. Biomass similarly increased from 70 kg in June to 740 kg in November (Figure 2).

From counts combined by season over all years for each species, Western Sandpipers accounted for at least 75% of shorebirds present in every season (Figure 3). Numbers of each of the other species represented less than 10% of the total in any particular season. Small species (<150 grams body weight) made up at least 90% of the total number of shorebirds in all seasons (Figure 3). Total biomass was more evenly distributed between small and large (>150 grams body weight) species; one species predominated in each category. Western Sandpipers had the highest biomass of the small species, and Marbled Godwits had the highest numbers and biomass of the large species (Figure 3).

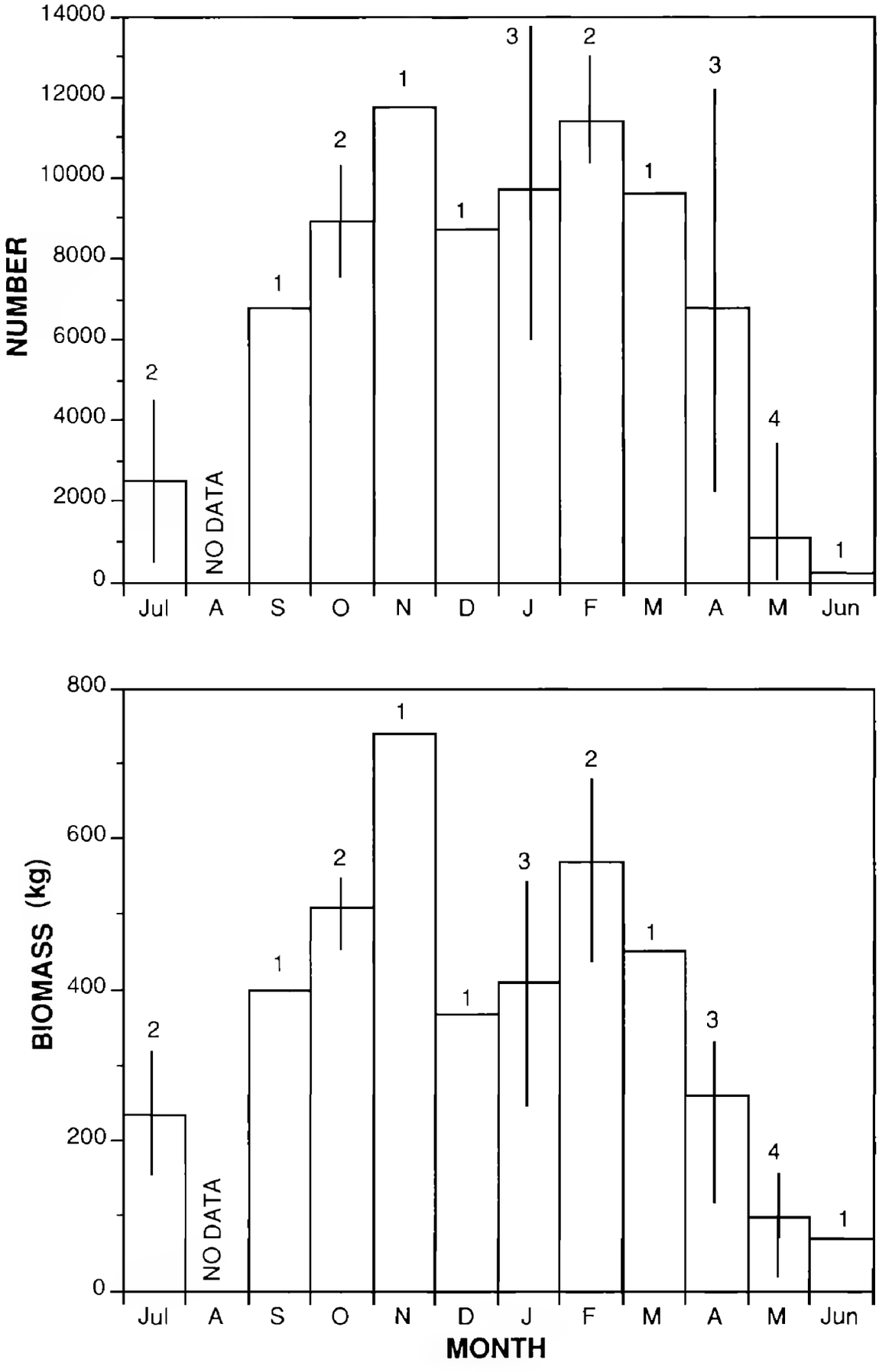
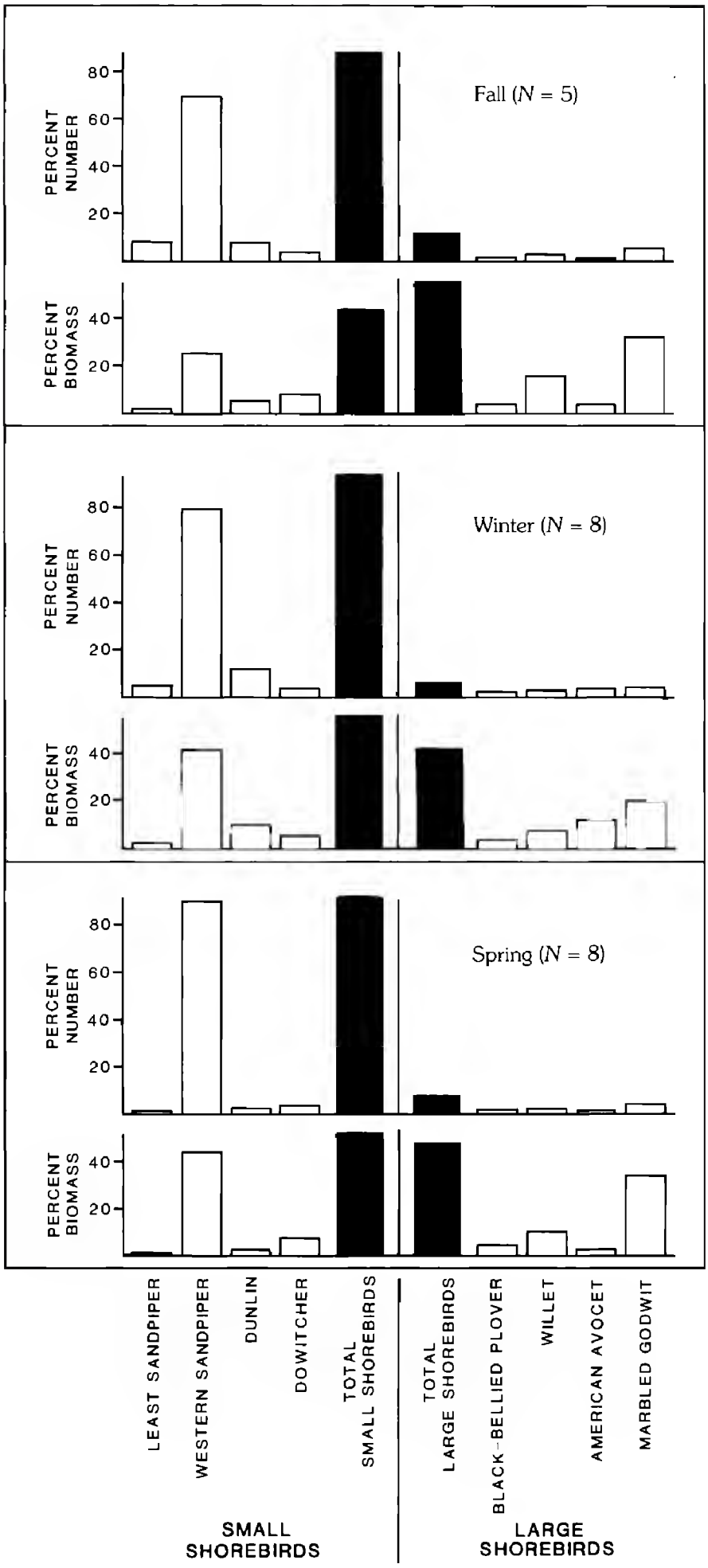


Figure 2. Seasonal changes in mean (vertical line is range) number and biomass of shorebirds along the main channel of Elkhorn Slough from November 1977 to February 1980. Number of surveys is indicated above each bar.


Fall (N = 5)
Winter (N = 8)
Spring (N = 8)
PERCENT NUMBER
PERCENT BIOMASS
80
60
40
20
LEAST SANDPIPER
WESTERN SANDPIPER
DUNLIN
DOWITCHER
TOTAL SMALL SHOREBIRDS
TOTAL LARGE SHOREBIRDS
BLACK-BELLIED PLOVER
WILLET
AMERICAN AVOCET
MARBLED GODWIT
SMALL SHOREBIRDS
LARGE SHOREBIRDS

The fall influx of most shorebirds began in June or July, except for that of Dunlins, which were not recorded until October (Figures 4 and 5). Least Sandpipers exhibited a fall peak in abundance, whereas Western Sandpipers did not (Figure 4). All common species overwintered in the slough. Numbers of Dunlins generally increased in early winter and spring. Although dowitchers were not distinguished morphologically, vocalizations indicated that more than 90% of the wintering birds were Long-billed Dowitchers. No small shorebird species were sighted in the area during summer, but nonbreeding birds of most large species were present during June (Figure 5). There was considerable variation in patterns of abundance for large and small species (Figures 4 and 5).

Habitat Use

Salt Ponds. Small shorebirds used the salt ponds primarily as a roost during high tide, secondarily as a feeding area. Western Sandpipers, Least Sandpipers, and Dunlins roosted in dense multi-species flocks in shallow ponds at the northwest corner and along dikes. From 830 to 20,730 small shorebirds (primarily Western Sandpipers and Dunlins) were counted per survey (N = 12) in the salt ponds. Of the small shorebird species that occurred in Elkhorn Slough, most individuals roosted in the salt ponds; no large flocks roosted elsewhere in the slough. Some small shorebirds fed intermittently near roosting flocks in the salt ponds. However, on average, 78.8% (standard error = 5.7) of Western Sandpipers and Dunlins were roosting. On falling tides, small sandpipers left salt-pond roosts and flew to exposed intertidal mudflats in the slough (N = 15 observations).

Large shorebirds also roosted in salt ponds. We observed as many as 350 Black-bellied Plovers and 700 American Avocets roosting in tight flocks in shallow ponds during single surveys. Willets and Marbled Godwits occasionally roosted in flocks up to 500 birds per survey, with only a few individuals feeding. Long-billed Curlews were not observed in salt ponds.

Several species fed in the salt ponds and were rarely or never observed in the main slough. We saw up to 400 Red-necked Phalaropes (*Phalaropus lobatus*), 200 Red Phalaropes (*P. fulicarius*), 150 Black-necked Stilts, 100 Snowy Plovers (*Charadrius alexandrinus*), and 30 Wilson's Phalaropes (*P. tricolor*) on single surveys. American Avocets, Black-necked Stilts, Snowy Plovers, and Killdeers bred locally in the salt ponds.

Salt Marshes. Maxima of 266 Willets, 257 Marbled Godwits, and 127 Long-billed Curlews were counted during the 3-hour surveys. These large shorebirds roosted and fed in salt marshes during high tides. Although most birds were observed flying over the marsh, an average of 24.3% (S.E. = 6.6) were roosting and 13.7% (S.E. = 4.2) were feeding. As the tide receded, most Marbled Godwits flew from the marsh to feed on intertidal mudflats. In

← Figure 3. Percent composition of most abundant small (<150 g) and large (>150 g) shorebird species by number and biomass from pooled data in fall (N = 5 surveys), winter (N = 8), and spring (N = 8) along the main channel of Elkhorn Slough. Species are ordered with increasing body weight from left to right.

contrast, some Willets and Long-billed Curlews continued to feed in the marsh during low tides. Some small shorebirds roosted on barren mudpans or in sparsely vegetated areas of marsh, but these scattered individuals never gathered in the large aggregations that occurred in the salt ponds. Small shorebirds never roosted in dense marsh vegetation.

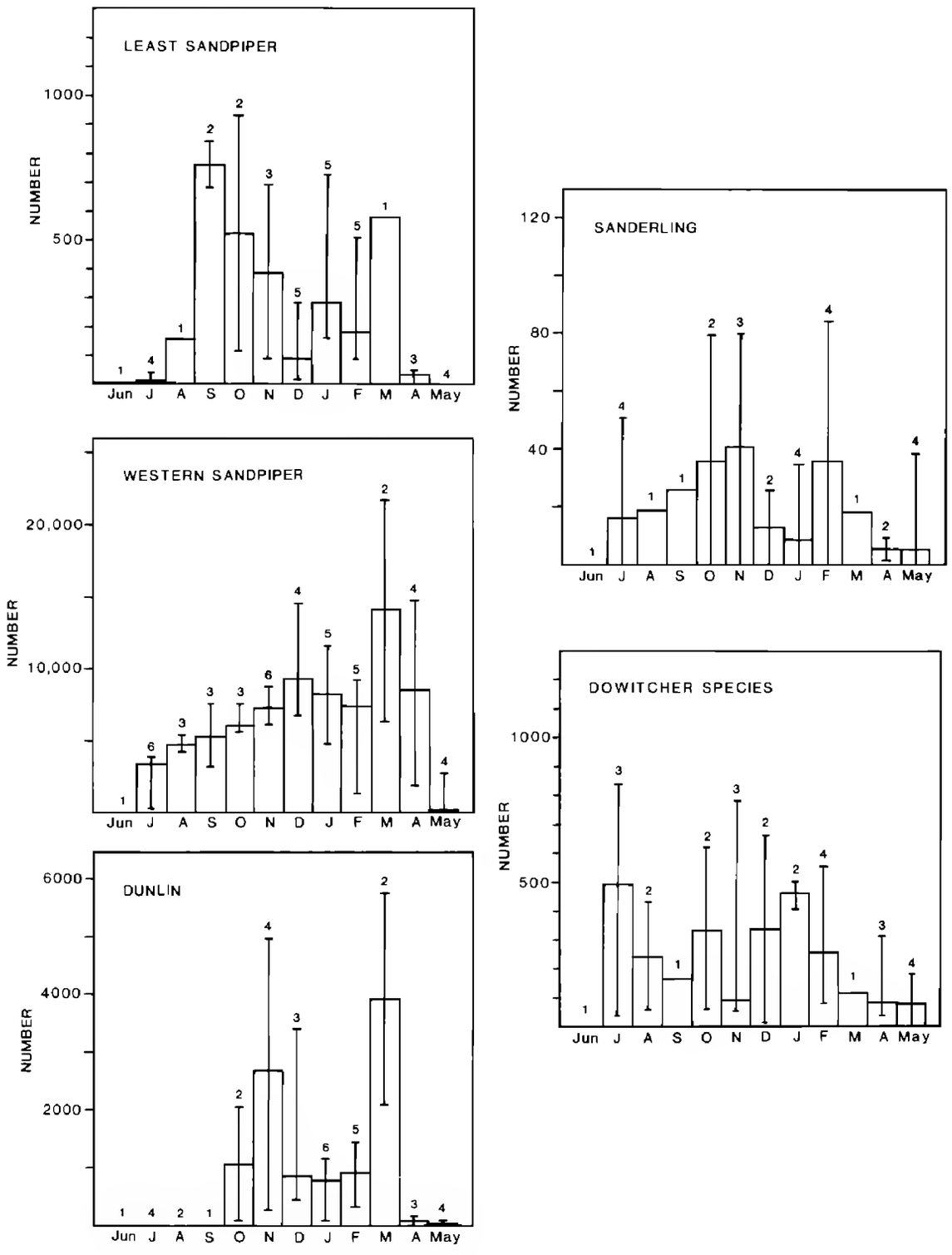


Figure 4. Median number (vertical line is range) of most abundant small (<150 g) shorebird species surveyed along the main channel of Elkhorn Slough. Number of surveys is indicated above each bar.

Mudflats. Intertidal mudflats were important feeding areas for all shorebird species. Density of Western Sandpipers that fed along the main channel of the slough increased generally with distance inland (the most muddy end of the slough), and was lowest at the most sandy intertidal flat near the mouth (Table 1). Mean densities of all large shorebird species were

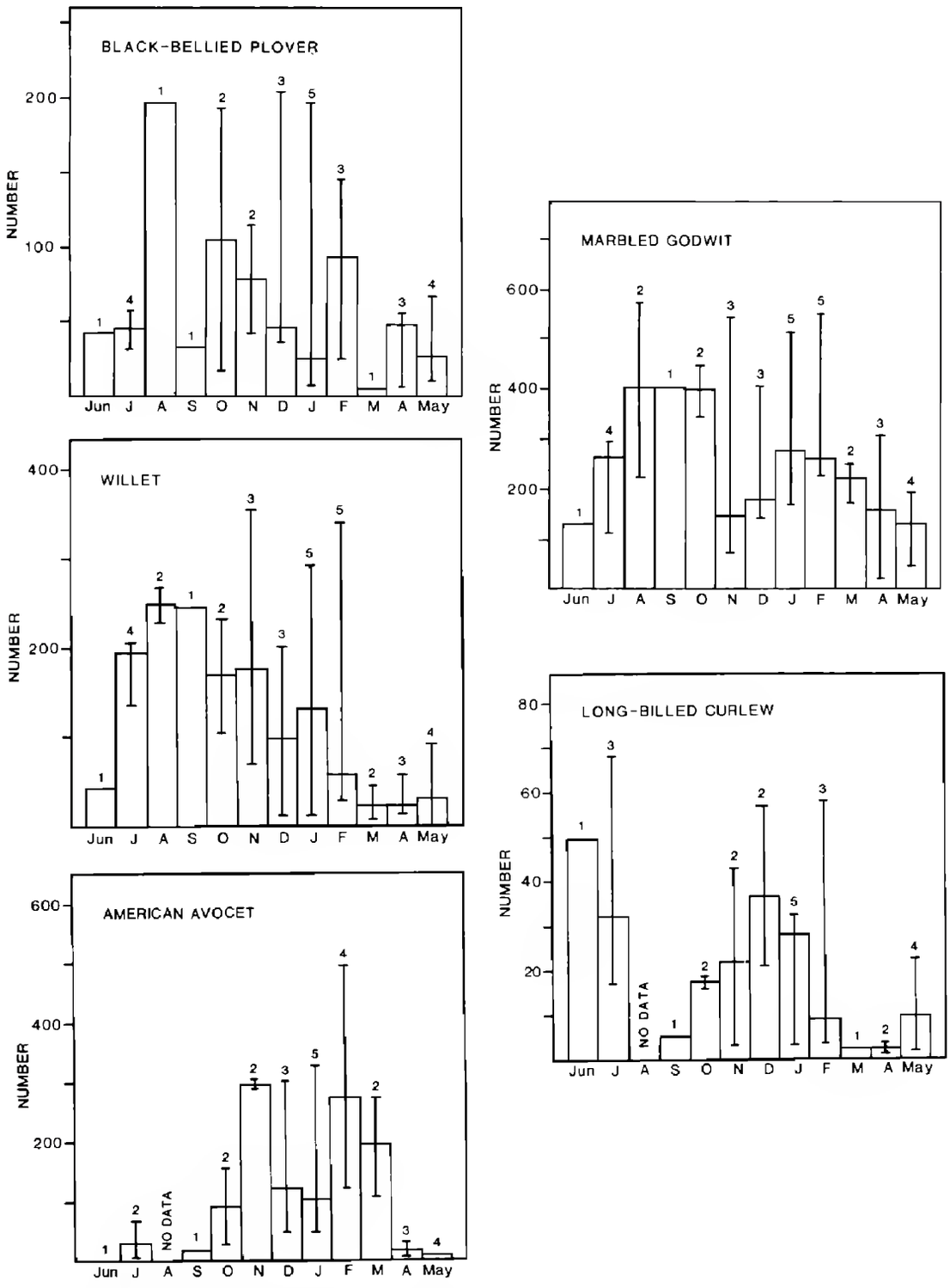


Figure 5. Median number (vertical line is range) of most abundant large (>150 g) shorebird species surveyed along the main channel of Elkhorn Slough. Number of surveys is indicated above each bar.

highest on mudflats about 3 km inland. Marbled Godwits and Sanderlings were the only species that fed in relatively high densities on the sandiest flats closest to the mouth. The relatively high mean density of Sanderlings at the most inland, muddy flat resulted from an unexpected count of 80 birds during one survey.

Diet

Western Sandpiper. Western Sandpipers primarily ate insects (mostly ephydrid fly larvae and pupae) and small infaunal invertebrates. Insect larvae and pupae ranked first in relative importance in fall and spring (Table 2). Prey composition of fall and winter samples differed markedly. Harpacticoid copepods, the bivalve *Gemma gemma*, Foraminifera, and the polychaete *Capitella capitata* occurred in at least 50% of stomachs from both seasons, but insects were not important in the winter diet (IRI = 11). Oligochaetes were found in 50% of the fall samples, but in none collected in

Table 1 Density (Number per Hectare) of Shorebirds Feeding on Intertidal Mudflats at Increasing Distance from the Mouth of Elkhorn Slough

	Distance up slough (km)				
Species	1	3	5	9	N^a
Small Shorebirds					
Least Sandpiper	0.7[b]	2.0	2.3	1.8	24
	(0.3)	(0.7)	(0.7)	(0.6)	
Western Sandpiper	5.5	51.6	100.6	64.4	24
	(1.6)	(8.5)	(14.8)	(13.0)	
Dunlin	4.4	7.1	13.2	10.5	19
	(2.4)	(2.3)	(6.7)	(4.3)	
Sanderling	0.7	0.1	0.1	0.2	14
	(0.2)	(0.1)	(0.1)	(0.2)	
Dowitcher	0.4	2.3	2.3	1.7	19
	(0.1)	(1.0)	(0.5)	(0.5)	
Large Shorebirds					
Black-bellied Plover	0.2	0.9	0.3	0.1	23
	(0.0)	0.3)	(0.1)	(0.0)	
Willet	0.4	1.4	1.2	0.6	22
	(0.1)	(0.4)	(0.3)	(0.1)	
American Avocet	0.3	2.1	1.0	0.5	16
	(0.2)	(0.7)	(0.3)	(0.2)	
Marbled Godwit	2.9	3.0	1.6	0.5	21
	(0.6)	(0.5)	(0.3)	(0.2)	
Long-billed Curlew	0.1	0.3	0.1	0.1	21
	(0.0)	(0.1)	(0.0)	(0.0)	

[a]Number of surveys.
[b]For each species, top row of figures is mean density, bottom row (in parentheses) is standard error.

winter. Amphipod crustaceans (*Corophium* spp. and Gammaridae) were the most important prey items in winter but nearly absent in fall. Although the relative occurrence of polychaetes (*Capitella capitata*) was high in fall and winter (FO = 75% and 86%, respectively), total number, volume, and IRI values probably were underestimated because of digestion (Page and Stenzel 1975, Quammen 1984). Algae, plant debris, and Foraminifera probably were ingested incidentally with other prey.

Willet. The highest-ranking prey of Willets in all seasons was the crab *Hemigrapsus oregonensis* (Table 3). In winter, another crab, *Pachygrapsus crassipes,* occurred in 63% of the stomachs, and ranked second in relative importance; crabs were the only prey in winter samples. In spring, Willets ate crabs and the opisthobranch snail *Haminoea*. Fall samples were more diverse, with eight prey categories. Willets ate many fewer species than did Western Sandpipers.

Marbled Godwit. In fall, polychaete worms (including *Capitella capitata*, *Boccardia hamata*, and Spionidae) ranked high in occurrence and relative importance (Table 4). Bivalves (*Gemma gemma* and *Macoma* spp.) also were relatively important (IRI = 942 and 412, respectively). In winter samples, these two bivalves were among the highest-ranking prey items. Polychaetes and crabs were secondarily important. No prey items occurred in more than 44% of the winter stomachs. In spring, the highest-ranked

Table 2 Seasonal Variation in the Diet of Western Sandpipers

	Fall (12)[a]		Winter (7)		Spring (11)	
Prey	%FO[b]	IRI[c]	%FO	IRI	%FO	IRI
Insect larvae	68	3063	14	11	100	15510
Seeds	68	2564	0	0	36	72
Harpacticoida	58	2115	57	237	0	0
Gemma gemma	50	801	57	157	18	119
Insect debris	42	627	43	293	0	0
Foraminifera	50	618	86	983	9	2
Capitella capitata	75	337	86	183	0	0
Algae and plant debris	67	321	57	318	54	76
Oligochaeta (Tubificidae)	50	172	0	0	0	0
Spionidae	42	119	0	0	0	0
Corophium spp.	17	7	100	5911	0	0
Gammaridae	0	0	71	3328	0	0
Ostracoda	25	23	100	1666	45	191
Crustacean fragments	25	36	43	525	0	0
Cumella vulgaris	25	23	43	317	0	0
Polychaete setae	8	1	43	179	0	0
Allorchestes angusta	0	0	43	70	9	6

[a]Number of stomachs examined in parentheses.
[b]FO, frequency of occurrence.
[c]IRI, index of relative importance (see text).

Table 3 Seasonal Variation in the Diet of Willets[a]

	Fall (5)		Winter (8)		Spring (8)	
Prey	%FO	IRI	%FO	IRI	%FO	IRI
Hemigrapsus oregonensis	40	855	88	9620	63	7201
Crab fragments	20	801	38	331	13	131
Orchestia traskiana	20	740	0	0	0	0
Hemigrapsus spp.	20	531	0	0	13	57
Eggs	20	389	0	0	0	0
Bivalvia	20	229	0	0	0	0
Algae and plant debris	20	219	0	0	13	181
Ostracoda	20	202	0	0	0	0
Pachygrapsus crassipes	0	0	63	3547	13	310
Haminoea/Bulla	0	0	0	0	13	129

[a]For abbreviations see Table 2.

prey categories were the crab *H. oregonensis* and the bivalve *Macoma* spp. Prey type, size, and diversity of the Marbled Godwit were intermediate between those of the Willet and the Western Sandpiper. Again, algae probably were eaten incidentally with other prey and occurred in the Marbled Godwit's diet throughout the year.

Table 4 Seasonal Variation in the Diet of Marbled Godwits[a]

	Fall (6)		Winter (9)		Spring (9)	
Prey	%FO	IRI	%FO	IRI	%FO	IRI
Polychaeta	83	5860	33	180	0	0
Capitella capitata	33	983	44	114	0	0
Gemma gemma	33	942	33	375	11	70
Spionidae	67	694	44	114	0	0
Macoma spp.	17	412	44	2248	44	1466
Bivalvia	17	211	33	776	22	301
Algae	50	115	33	599	67	1799
Boccardia hamata	17	95	6	0	0	0
Protothaca staminea	17	95	11	12	22	385
Macoma nasuta	0	0	44	1016	0	0
Hemigrapsus spp.	17	1	22	259	0	0
Hemigrapsus oregonensis	0	0	11	223	44	1926
Pachygrapsus crassipes	0	0	11	124	0	0
Crab fragments	17	16	0	0	22	675
Eggs	0	0	0	0	22	155

[a]For abbreviations see Table 2.

DISCUSSION

Relative to most coastal wetlands on the Pacific Flyway, Elkhorn Slough supports large numbers of wintering and migrating shorebirds, representing nearly 40 species (Point Reyes Bird Observatory [PRBO], unpubl. data). During recent surveys of 48 California wetlands that likely have more than 1000 shorebirds, Elkhorn Slough ranked third in gross number of birds, holding 1–3 % (>19,000 birds) of all shorebirds counted in spring and 5–6% (>30,000 birds) of those counted in fall (PRBO, Pacific Flyway Project, unpubl. data from September 1988 to April 1990). Comparison with Humboldt Bay, which ranked a close second in gross number of birds but which is 20–30 times larger in surface area, shows the importance of Elkhorn Slough to shorebirds along the central coast. Numbers of birds were highest (relative abundance 73-88%) in the San Francisco Bay system, whose surface area is several orders of magnitude larger than that of any other California wetland.

Shorebirds common in Elkhorn Slough occur commonly in other coastal wetlands along the California coast. As in Elkhorn Slough, either Willets or Marbled Godwits were among the most abundant large shorebirds, and Western Sandpipers, Least Sandpipers, dowitchers, and Dunlins were among the most abundant small shorebirds in San Diego Bay (Jehl and Craig 1970), San Francisco Bay (Page et al. 1990), wetlands from Point Reyes to Bodega Bay (Shuford et al. 1989), and Humboldt Bay (Gerstenberg 1979). The same large species that oversummer at Elkhorn Slough do so elsewhere along the California coast (Jurek 1974, Shuford et al. 1989).

There are some differences in abundance, however, between wetlands. Whereas Western Sandpipers clearly were the dominant species in Humboldt Bay, Elkhorn Slough, and San Francisco Bay, Least Sandpipers were as abundant in the Point Reyes area; Willets, Marbled Godwits, Least Sandpipers, and Western Sandpipers were equally abundant in Morro Bay (Stenzel et al. 1989, Page et al. 1990). Differences among wetlands in occurrence and relative abundance of shorebirds can be influenced by climate, hydrography, and habitat resources (Shuford et al. 1989).

Because species-specific density has not been estimated for shorebirds in most locations, comparisons among wetlands are difficult. Even though the most abundant wintering shorebird species were the same in Elkhorn Slough as from Point Reyes to Bodega Bay, densities in the slough usually were higher; e.g., mean densities of Western Sandpipers and American Avocets in the slough were about six times higher than maximum densities in the wetlands from Point Reyes to Bodega Bay (Table 5; Page et al. 1983).

Seasonal patterns in abundance of each shorebird species in Elkhorn Slough, as at any location, reflect time of migration and routes of travel between breeding and wintering grounds. In general, most species of wintering shorebirds move into California from July to November; spring exodus to the breeding grounds occurs from late March to early May (Jurek 1974, Shuford et al. 1989). In coastal wetlands of central California, peaks in abundance of fall migrants usually are apparent for Short-billed Dowitch-

Table 5 Mean Winter Density (Number per 100 ha) of Shorebirds on Tidal Flats in Elkhorn Slough and Range of Densities in Point Reyes–Bodega Bay Area

Species	Elkhorn Slough	Point Reyes–Bodega Area[a]
Least Sandpiper	213 (39)[b]	47–180
Western Sandpiper	6020 (490)	59–1055
Dunlin	1025 (243)	634–1299
Sanderling	23 (7)	16–129
Dowitcher (two species)	255 (63)	18–71
Black-bellied Plover	61 (14)	94–141
Willet	114 (23)	93–140
American Avocet	165 (28)	0–27
Marbled Godwit	223 (28)	113–758
Long-billed Curlew	20 (4)	0–12

[a]Includes Bolinas Lagoon, Limantour Estero, Drake's Estero, and Abbott's Lagoon. Data from Page et al. (1983).
[b]Figures in parentheses are standard errors.

ers, Least Sandpipers, Willets, Sanderlings, and sometimes Western Sandpipers and Black-bellied Plovers (Shuford et al. 1989). Marbled Godwits, Long-billed Curlews, American Avocets, and Dunlins do not exhibit these peaks. Spring peaks in abundance are described for Western Sandpipers and dowitchers. These general patterns in seasonal abundance do not apply to all the state's wetlands. For example, a well-defined peak was noted in fall for Western Sandpipers in Bolinas Lagoon, whereas very small or no peaks were obvious elsewhere around Point Reyes (Shuford et al. 1989).

The beginning of fall migration into Elkhorn Slough in July and spring movement out of the slough in late March generally follows the established migratory periods. Timing of fall migration is dependent on age and reproductive status of individual birds; e.g., generally, adults migrate earlier than do immature birds (Page et al. 1979). This extended migration can obscure peaks from site-specific surveys such as ours. Also, because dowitcher species were not distinguished in Elkhorn Slough, the larger population of wintering Long-billed Dowitchers could have masked the peaks of migrating Short-billed Dowitchers. A comprehensive survey of the regional wetlands of Monterey Bay, as well as a long-term intensive study of Elkhorn Slough, is necessary before seasonal patterns in abundance can be described adequately.

Changes in abundance also occur because of localized movements of shorebirds (Pienkowski and Evans 1984). Local movements may be synchronous with time lags between low tides at various locations, thus extending foraging time (Connors et al. 1981). Additionally, abundance can vary with daily movement of some species to feed in inland fields (Townshend 1981, Ruiz et al. 1989). Daily movements of Willets, Marbled Godwits, Black-bellied Plovers, and Sanderlings between Elkhorn Slough and adjacent beaches of the outer coast and river mouths occurred fre-

quently during winter (J. Warriner pers. comm.). Irregular shifts in abundance of Least Sandpipers, Western Sandpipers, Dunlin, and dowitchers between the slough and the mouths of the Pajaro and Salinas rivers (5 and 8.8 km away, respectively) also are likely, because numbers of birds in these areas seem to fluctuate with habitat availability. Elkhorn Slough is the likely source of these birds because it is the closest large area of suitable habitat.

The restoration of wetlands in Elkhorn Slough resulted in increased surface area of mudflats and up to an average of 0.8 hours phase lag of high and low water relative to Monterey predicted tides (Wong 1989); these changes can influence shorebird foraging behavior and local movements. Movements of greater distance are possible, especially to San Francisco Bay, which because of its large size may serve to attract and aggregate shorebirds on the central California coast. Near Point Reyes, for example, Marbled Godwits and American Avocets move daily from foraging grounds in Bolinas Lagoon to probable nighttime roosts in San Francisco Bay (Blick 1980, Shuford et al. 1989). Snowy Plovers also move between Monterey and San Francisco bays (J. Warriner pers. comm.).

In Elkhorn Slough, shorebirds roosted in salt marshes and salt ponds during high tide, then moved to intertidal mudflats to feed at low tide. Shorebird species were not distributed evenly over tidal flats. The increased incidence of Western Sandpipers feeding at the most muddy intertidal sites in Elkhorn Slough recalls Quammen's (1982) findings that shallow-feeding shorebirds, such as Western Sandpipers, spent more time feeding and were more successful at prey capture on intertidal mudflats having little sand. She suggested that sand interferes with detection and capture of prey (small polychaetes and oligochaetes) because of similarity in size.

Seasonal changes in the diet of the Western Sandpiper and the Marbled Godwit were considerable, and probably related to spatial and temporal variation in availability of prey, although prey populations were not sampled. In other coastal wetlands, insect larvae and pupae (Order Diptera) occur in high densities near the surface of mudflats during warm fall months and are common in the diet of some species of small shorebirds, especially Western Sandpipers (Couch 1966, Page and Stenzel 1975, Stenzel et al. 1983). Other prey species of Western Sandpipers and Marbled Godwits were among the most abundant infaunal invertebrates in the mudflats of Elkhorn Slough (Nybakken and Jong 1977). Similar prey types have been reported in the diet of Western Sandpipers (Page and Stenzel 1975, Quammen 1984) and Marbled Godwits (Recher 1966, Holmberg 1975, Page and Stenzel 1975) from other coastal areas, although the relative importance of each type varied with location.

Salt marshes were used primarily by large shorebirds. Small shorebirds were not observed in areas of Elkhorn Slough where marsh vegetation was tall and dense, but they did feed and roost in sparse vegetation of the upper-slough marsh, suggesting that use of this habitat was restricted by height and density of vegetation. Willets were the only shorebirds that fed regularly in large numbers in the salt marsh. Their diet was dominated by crabs that are abundant in vertical banks of the marsh (Sliger 1982) and larger than the infaunal prey consumed by Western Sandpipers and Marbled Godwits on intertidal mudflats. Willets have similar feeding habits in other coastal

wetlands (Reeder 1951, Recher 1966, Holmberg 1975, Stenzel et al. 1976).

The salt ponds adjacent to Elkhorn Slough were the primary roosting areas for small shorebirds, American Avocets, and Black-bellied Plovers. Salt ponds in San Francisco Bay were similarly used by these species (Swarth et al. 1982). Seasonal changes in water depth reduce space available for resting or feeding in salt ponds (Swarth et al. 1982); rising water levels from winter rains restricted this space for small sandpipers in Elkhorn Slough. In general, little feeding took place in the salt ponds, but there were important exceptions.

Several uncommon species of shorebirds (e.g., phalaropes) roosted and fed exclusively in salt ponds. The salt ponds were not flushed by the tide during our surveys. However, when a major dike broke in 1984 and a large salt pond was exposed to tidal action, many shorebirds began to feed on the new intertidal mudflat.

The considerable variation in spatial and temporal use of habitat by a large variety of shorebirds within Elkhorn Slough and surrounding areas, and exchange of birds between these habitats, suggests that this wetland system is important to the viability of migrating shorebird populations. The intertidal mudflats can be regarded as critical and sensitive habitat for many of the shorebirds feeding in Elkhorn Slough during their annual migratory cycle. Degradation of this habitat could reduce the reproductive success and affect the survival of these populations.

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EXPERIMENTS WITH ALLEN'S AND ANNA'S HUMMINGBIRDS AT SUGAR WATER FEEDERS IN SPRING

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Because most ornithophilous flowers in North America are red (Pickens, 1930, 1941, Pickens and Garrison 1931, Grant 1966, Grant and Grant 1968), a general belief has arisen that hummingbirds have coevolved an innate preference for red flowers. This view has been supported and challenged by field (Woods 1927, Wagner 1946, Stiles 1976) and experimental studies (Sherman 1913, Bené 1941, 1945, Lyerly et al. 1950, Collias and Collias 1968, Miller and Miller 1971, Ewald 1979, Wheeler 1980, Welker 1984). These and other workers have proposed that feeding hummingbirds may be influenced by weather, time of day, location of food source, chemical composition of nectar, concentration of nectar, proximity to perches, availability of alternate foods, and competition.

We recorded 7517 minutes of observations of Allen's (*Selasphorus sasin*) and Anna's (*Calypte anna*) hummingbirds at Arcata, Humboldt County, California, 20 February–3 May 1972 and 31 January–14 February 1973, using a station where experimental solutions could be presented to wild birds in a uniform, carefully controlled manner. At Arcata, Anna's Hummingbird, an uncommon resident, breeds in late winter and early spring. Allen's Hummingbird is a common to abundant spring migrant, summer resident, and breeder but occurs in winter only as a vagrant (Yocom and Harris 1975, Harris 1984). We recorded all *Selasphorus* as Allen's Hummingbird, but a few early spring migrants possibly were Rufous Hummingbirds (*S. rufus*), an uncommon spring migrant in northwest California (Yocom and Harris 1975).

METHODS

The experimental apparatus consisted of a piece of plywood approximately 1 m long, 75 mm wide, and 13 mm thick, nailed across the lower half of a sash window of a suburban residence. The board was held about 100 mm from the glass. The window was adjacent to a larger window on one side and a blank wall on the other side. We drilled four holes, 200 mm apart, in the board. Experimental solutions consisted of ordinary white sugar (sucrose) and water in 61-ml feeders. Each feeder consisted of a clear glass bottle and a clear glass stem (feeder tube) held in the bottle by a small red rubber cork. In most experiments, we covered the red corks with white plastic tape. We discarded red plastic support sleeves supplied with the feeders. The stem of each feeder was inserted through a hole in the board, and the feeder was held in place with white elastic tape. We used four feeders in 1972, but in 1973 we placed feeders only in the two center holes of the board. We rotated the feeders across the positions on the board daily;

thus, each experimental solution occupied each position once every four days in 1972 and every other day in 1973. Feeder position 1 was closest to the adjacent window and position 4 was adjacent to the blank wall. We refilled feeders with experimental solutions at the end of each day's activity or more often as needed. We determined the initial positions of feeders by throwing a die. We separated some experiments with "rest" periods 3–24 days long, when we replaced experimental feeders with a large feeder hung in front of the board to maintain the interest of the birds in the station. The large feeder was filled with colorless 50 percent sugar water.

We measured hummingbird use of the station in three ways: (1) The appearance of one bird hovering or perching immediately in front of a feeder was scored as a "visit" with each shift of a bird between feeders scored separately. Birds appearing at the station simultaneously were all scored separately. (2) The act of a bird inserting its bill into the stem of a feeder was scored as a "sip" regardless of the duration of each sip. A single visit might generate 0 to 30+ sips. (3) Total daily consumption at each feeder was measured with a graduated cylinder when the feeders were refilled to maximum capacity. We abandoned attempts to record the duration of visits and sips with a stopwatch because we were unable to record data fast enough when spring migrants sometimes made more than 30 visits per minute and when two to seven birds commonly made simultaneous visits.

We recorded data from inside the house through a closed window. Window shades covered the top half of the window supporting the feeder rack and all of the large window immediately adjacent to feeder position 1. We took records sporadically throughout many days, but most data were from the two hours before and the one-half hour after sunset. We recorded the species and sex of each visitor.

We conducted experiments to test (1) sugar concentration preference, (2) feeder position preference, (3) red–blue–yellow–green color preference, (4) red–blue color preference, and (5) the effect of adding a perch on use rates of feeders. Protocols for each experiment were as follows:

Concentration trials—Trial 1: 20–26 February 1972, 1590 minutes of observation time. Trial 2: 27 February–5 March 1972, 1371 minutes. Experimental solutions: 0 (plain water); 33% sugar (one part sugar to two parts water by volume); 50% sugar (equal parts sugar and water by volume); 66% sugar (two parts sugar to one part water by volume). All solutions and feeders were uncolored, feeders were rotated for position daily, and stem corks were covered with white plastic tape.

Position trial—8–14 March 1972, 1919 minutes. All feeders contained colorless 50% sugar solution, were uncolored, were rotated daily, and had their stem corks covered with white plastic tape.

Color trial 1—16–23 March 1972, 1132 minutes. All feeders contained colorless 50% solution and were rotated daily. The entire feeder, including stem, stem cork, and bottle, was wrapped with colored plastic tape to achieve clear, consistent colors that could be duplicated without introducing any taste bias that might happen with food dyes. Colors used were red, blue, yellow, and green.

Color trial 2—31 January–14 February 1973, 803 minutes. Protocol as above except we used only red and blue feeders and rotated these on alternate days between the two center positions on the board.

Perch trials—17–24 April 1972 and 26 April–3 May 1972, 712 minutes. We attached a movable wire perch in front of one feeder. This perch was rotated across the board between the positions daily. Feeders were uncolored and filled with colorless 50% sugar water; red stem corks were exposed. We measured use in the first trial by visits, sips, and total consumption, in the second trial by total consumption only.

In most experiments, we tested the results with a chi square analysis using pooled data for each experiment (d.f. = 1) and the hypothesis that the expected rates of use for any single feeder equaled 25% (1:3 ratio) of total use in the four-feeder, 1972 trials, and 50% (1:1 ratio) of total use in the two-feeder, 1973 trials.

RESULTS

Seasonal and Species Composition of Use

Between 31 January and 14 February 1973, we recorded only Anna's Hummingbirds during 803 minutes of observations. This species made 31.4 visits per 100 minutes of observation time, nearly 92% by males (Table 1). Between 20 February and 26 February 1972, Allen's Hummingbirds accounted for 26% of all visits, but no females of either species were seen (Table 1). By late February and early March, the proportion of Allen's Hummingbirds had increased to about one-third of all visits, and the rate of visits per 100 minutes of observation time had increased, but no females had yet appeared. In the second week of March, female Allen's Hummingbirds appeared at the feeders as frequently as males, while use rates of Anna's Hummingbird males remained essentially unchanged from the previous period. By late March, use rates by Allen's increased to more than 60 visits per 100 minutes for each sex, while the use by Anna's males remained stable at about 34 visits per 100 minutes (Table 1). By mid-April, use by both sexes of Allen's and by male Anna's had increased dramatically. A striking aspect of these data is that female Anna's Hummingbirds rarely used the station, though they occasionally foraged in nearby flower beds.

Simultaneous Visits

Of 1082 total visits recorded in early trials (31 January–5 March), 99.8% involved single birds. The frequency of simultaneous visits increased with the influx of spring migrants to 16.5% of 2461 visits (8–14 March) and 35.1% of 4228 visits (16–24 March). Simultaneous visitors either shared a feeder and drank at the same feeder stem, or they made unshared visits to different feeders on the rack. All data combined, 81.1% of 7773 visits were by single birds, 13.8% were by two or more birds feeding simultaneously at different feeders, and 5.1% were of two or more birds sharing one feeder. Nearly two-thirds (64.7%) of the 1472 birds recorded feeding together occurred as pairs, another 357 (24.3%) occurred in groups of three, 124 (9.4%) occurred in groups of four, and 39 (2.5%) in groups of five or more.

Table 1 Seasonal Distribution of Rate and Percentage of Visits at Sugar-Water Feeding Station by Allen's and Anna's Hummingbirds, Arcata, Humboldt County, California

Period	Type of Trial	Allen's Hummingbird				Anna's Hummingbird			
		Males		Females		Males		Females	
		Visits/ 100 min	Percent Total	Visits/ 100 min	Percent Total	Visits/ 100 min	Percent Total	Visits/ 100 min	Percent Total
31 Jan–14 Feb 1973	Color 2	0	0	0	0	28.8	91.7	2.6	8.3
20–26 Feb 1972	Concentration 1	4.3	26.1	0	0	12.2	73.9	0	0
27 Feb–5 Mar 1972	Concentration 2	13.0	31.0	0	0	28.9	69.0	0	0
8–14 Mar 1972	Position	48.4	37.7	46.3	36.2	33.2	25.9	0.25	0.2
16–23 Mar 1972	Color 1	60.4	37.5	65.7	40.8	34.2	21.2	0.8	0.5
17–24 Apr 1972	Perch 1	80.5	23.8	199.7	59.1	57.3	17.0	0.2	0.1

The largest single group we saw was seven birds at four feeders simultaneously during the position trial and the largest number we saw sharing a single feeder was four at a red feeder during the first color trial.

Concentration Trials

In the first concentration trial, both species preferred the 50% solution as measured by both visits and sips. Both species generally visited the 66% solution at about the expected rate (Table 2), but Anna's exceeded the expected rate when measured by sips. Both species generally used the clear water and 33% solutions at less than expected rates. The total consumption of sugar water by both species combined deviated from the expected 25% rate for clear water (no measurable amount taken) and the 66% solution (50% of all sugar water taken).

In the second trial, both species avoided the clear water and preferred the 66% solution. Allen's Hummingbirds used the 33 and 50% solutions at about expected rates, but Anna's Hummingbird used the 50% solution at greater than expected rates and the 33% solution at less than expected rates.

Effect of Feeder Position

We conducted the position trials after many female Allen's Hummingbirds had joined the feeding flock (Table 1). Both sexes of Allen's Hummingbird generally used position 1 at less than expected rates as measured by visits (13.4% of 928 visits by males, 16.4% of 890 visits by females) and

Table 2 Percentage of Use of Four Concentrations of Sugar Water by Male Allen's and Anna's Hummingbirds, 20 Feb–5 Mar 1972, Arcata, Humboldt County, California

Species	Measure of Use	*n*	Percentage of Sugar 0	33	50	66
Trial 1 (20–26 Feb 1972)						
Allen's	Visits	67	6.0[a]	17.9[b]	55.2[a]	20.9[b]
	Sips	288	2.0[a]	10.8[a]	61.5[a]	25.7[b]
Anna's	Visits	194	6.7[a]	15.4[a]	47.9[a]	29.0[b]
	Sips	1350	1.1[a]	14.1[a]	46.5[a]	38.2[a]
Total Consumption (ml)		60	0[a]	16.7[b]	33.3[b]	50.0[a]
Trial 2 (27 Feb–5 Mar 1972)						
Allen's	Visits	177	4.5[a]	22.0[b]	31.6[c]	41.8[a]
	Sips	629	1.2[a]	21.8[b]	28.0[b]	49.0[a]
Anna's	Visits	394	4.3[a]	13.7[a]	34.5[a]	47.4[a]
	Sips	1727	1.3[a]	7.3[a]	33.6[a]	57.8[a]

[a]$P < 0.01$. P based on χ^2 from pooled data for all days of observation (d.f. = 1); χ^2 hypothesis is that expected rate of use for any single concentration = 25% of total.
[b]Not significant.
[c]$P < 0.05$.

sips (15.7% of 2144 sips by males, 17.3% of 2440 sips by females; $P < 0.01$ for all tests). Male Allen's used positions 3 (31.5% of visits, 32% of sips) and 4 (28.7% of visits, 29.3% of sips) at greater than expected rates, but female Allen's exceeded expected rates (33.7% of visits, 33.1% of sips; $P < 0.01$ for all tests) only at position 4. Male Anna's exceeded expected rates at position 2 (29% of 638 visits and 28% of 1903 sips, $P < 0.02$ for visits and < 0.01 for sips), and visited position 3 at a less-than-expected rate (21.2%; $P < 0.01$) as measured by sips. As measured by consumption, the amount of total solution taken at position 1 was slightly less (20.9% of 401 ml) than at the other positions, but this difference was not strongly significant ($P < 0.10$). To summarize, there was a bias by Allen's Hummingbird away from the feeder nearest the adjacent window (position 1) and toward the feeder nearest the blank wall (position 4, but Anna's Hummingbird did not show a strong bias for or away from any feeder position.

Color Trials

In 1972 male Allen's and Anna's and female Allen's hummingbirds all used the red feeder at rates higher than expected as measured by visits, sips, and total consumption (Table 3). Though the sample for female Anna's Hummingbirds was too small to test statistically, 55.5% of all visits and 69% of all sips recorded were at the red feeder, compared to expected rates of 25%. Male Allen's also used the blue feeder more than expected as measured by both visits and sips, but the female Allen's used the blue feeder less than expected. Both sexes of Allen's Hummingbird used the yellow and green feeders less than expected with the green feeder the least preferred by far. Male Anna's Hummingbird used the green feeder far less than expected and generally used the blue and yellow feeders about as expected.

Table 3 Percentage of Use of Sugar-Water Feeders of Four Colors by Allen's and Anna's Hummingbirds, 16–23 Mar 1972, Arcata, Humboldt County, California

Species	Sex	Measure of Use	*n*	Color			
				Red	Blue	Yellow	Green
Allen's	Male	Visits	684	44.4[a]	31.1[a]	13.9[a]	10.5[a]
		Sips	1757	47.2[a]	28.2[a]	14.2[a]	10.4[a]
Allen's	Female	Visits	744	62.6[a]	19.2[a]	13.4[a]	4.7[a]
		Sips	2305	66.4[a]	19.3[a]	10.1[a]	4.1[a]
Anna's	Male	Visits	388	38.4[a]	24.2[b]	22.7[b]	14.7[a]
		Sips	1454	35.7[a]	23.4[b]	28.5[a]	12.5[a]
Anna's	Female	Visits	9	55.5[c]	0[c]	33.3[c]	11.1[c]
		Sips	29	69.0[c]	0[c]	24.1[c]	6.9[c]
Total Consumption		(ml)	367	61.6[a]	17.8[a]	13.8[a]	6.9[a]

[a] $P < 0.01$. P based on χ^2 values from pooled data for all days of observation (d.f. = 1); χ^2 hypothesis is that expected rates of use for any single color = 25% of total.
[b] Not significant.
[c] Sample size for female Anna's Hummingbird too small to calculate χ^2 values.

These birds consumed 61.6% of all sugar water taken through the red feeder, a rate much greater than expected, and they took nectar from the other three colors at rates less than expected. The least used feeder was green, accounting for only 6.9% of the total consumption during the 8-day trial.

Further clear evidence of the preference for the red feeder is demonstrated by data on simultaneous visits. Birds arriving at the station when another bird was already present were confronted with four choices: (1) displace the bird already present and take over its feeder; (2) share the same feeder with the first bird; (3) use a nearby or adjacent feeder and drink there simultaneously; or (4) leave without drinking. We observed all four events frequently. All data combined, about 50% of all single visits were at the red feeder, 40.3% of birds feeding simultaneously but at separate feeders used the red feeder, and 75.7% of birds sharing the same feeder were at the red feeder. In fact, of all trials, the highest rate of shared use occurred during the color trial when 9.7% of 1825 visits were shared visits compared to only 5.9% for the perch trial (2403 visits) and only 2.7% for the position trial (2461 visits). During the color trial, most birds sharing a single feeder were at the red feeder. In some cases a bird originally using the red feeder was displaced by an arrival only to move to another color when the arrival took over the red feeder; in these cases, it was clear that the first color of choice for both birds was red.

We offered red and blue in early February 1973 when only Anna's Hummingbird was present (Table 1). Male Anna's used the red feeder at rates much higher than expected as measured by both visits and sips (Table 4). Female Anna's also used the red feeder more than the blue feeder, but the difference was not significant for the small sample of observations (Table 4). Nearly 71% of all sugar water taken in the trial was from the red feeder compared to an expected 50%.

Table 4 Percentage of Use of Sugar-Water Feeders of Two Colors by Anna's Hummingbirds, 31 Jan–14 Feb 1973, Arcata, Humboldt County, California

Sex	Measure of Use	*n*	Percent Total Use	
			Red	Blue
Male	Visits	231	62.8	37.2[a]
	Sips	833	65.4	34.6[a]
Female	Visits	21	57.1	42.9[b]
	Sips	42	64.3	35.7[b]
Total Consumption (ml)		236	70.8	29.2[a]

[a]$P < 0.01$. P based on χ^2 values from pooled data for all days of observation (d.f. = 1); χ^2 hypothesis is that expected rate of use of any single color = 50%.

[b]Not significant.

Perch Trials

Male Allen's Hummingbird visited feeders with a perch on 18.5% of 573 visits, less than the expected 25% rate ($P < 0.01$), but female Allen's and male Anna's showed no preference for or against the perch. Female Allen's and male Anna's sipped from feeders with a perch more than expected (33.9% of 4031 sips and 36.7% of 1492 sips, respectively, $P < 0.01$), but male Allen's did not. In both trials total consumption at feeders with perches exceeded expected rates ($P < 0.01$)

Daily Pattern of Use

Rates of use were at generally low levels for both species most of the day, but increased dramatically beginning about 1700 hours and continued to increase until feeding activities stopped 30–45 minutes after local sunset (Figure 1). Generally any territorial claims established during the day were overwhelmed near sunset when many birds appeared and when some individuals, particularly male Anna's, made visits consisting of 20+ sips

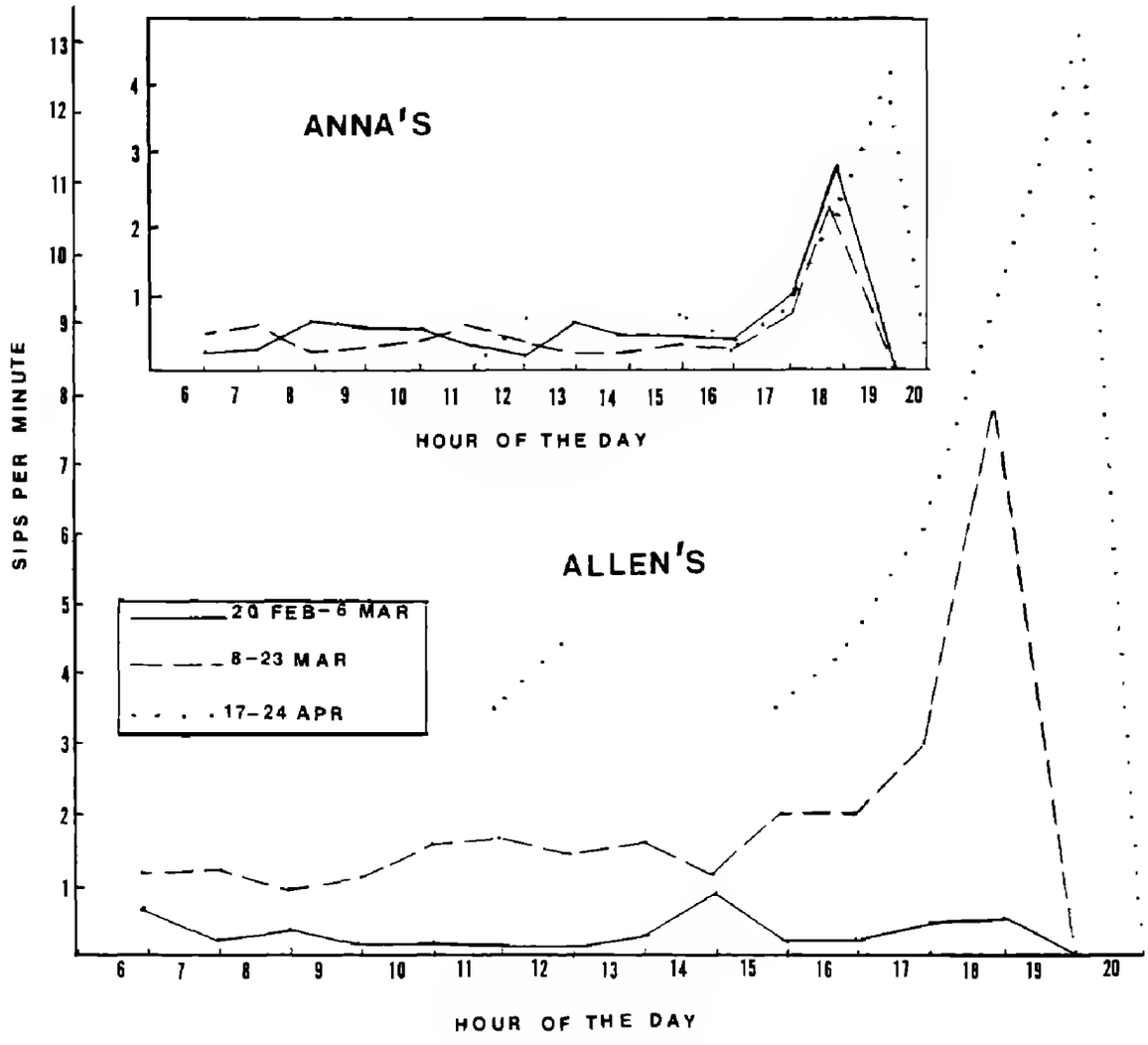

Figure 1. Hourly distribution of feeding activity at sugar water feeders by Allen's and Anna's hummingbirds, spring 1972, Arcata, California.

compared to an average of 2–3 sips per visit during other daylight hours. This pattern of increased use late in the day remained constant throughout the spring.

DISCUSSION

The 1972 studies occurred during a spring of unusually heavy use. Observations in other years suggest that "normal" usage rates in March and April were about one-quarter as high as in 1972. We have no explanation for the heavy use in 1972, but migrant swarms of hummingbirds sometimes are attracted to seasonal food sources (Stott 1942, Stiles and Wolf 1970). Our data showed that male Allen's Hummingbirds migrate into California's north coast somewhat earlier than do females. Phillips (1975) reported a similar pattern in both spring and fall.

Female Anna's Hummingbirds used the station only slightly. Possible explanations could be a low population of females in the area during the study, varying nutritional requirements for females just entering the nesting period (Pitelka 1951, Kelly 1955), or the inability of females to compete with massive numbers of migrant Allen's and the normal territoriality of male Anna's Hummingbirds. Most of the recorded usage by female Anna's was in February 1973, before any Allen's arrived. Even then, males outnumbered females (Table 1). Several workers have mentioned that female hummingbirds do not feed in males' territories and defend only small territories near the nest while breeding. Southwick and Southwick (1980) reported that female Ruby-throated Hummingbirds (*Archilochus colubris*) fed solely on tree sap at sapsucker holes in Michigan in early spring, while males used both nectar and sap. Ewald (1979) found that female Anna's were less territorial and less able than males to defend food sources. Nesting female Costa's Hummingbirds (*Calypte costae*) seemed to visit flowers less often than did males, but foraged inside nonflowering trees and shrubs (Woods 1927). Similar patterns have been reported for tropical species (Stiles and Wolf 1970). Male White-eared Hummingbirds (*Hylocharis leucotis*) excluded females and immatures from the "most suitable" flowers and forced them to feed at flowers under vegetative cover (DesGranges 1978).

Our study was conducted at a time when when Anna's Hummingbird apparently was in the process of colonizing the north coast as a nesting species (Zimmerman 1973), and it is possible that the early invaders in the range extension process were mostly males. Anna's Hummingbird is now an established breeder in the area, yet we still rarely see females at sugar water feeders.

Previous workers have emphasized the importance of the relative position of food sources and of perches as a factor determining hummingbird food use (Bené 1945, Collias and Collias 1968, Miller and Miller 1971, Wheeler 1980). In our study, Allen's Hummingbirds used feeder position 1 at less and feeder position 4 at more than expected rates even though all feeders were essentially equidistant from perches used by the birds. Feeder 1 was adjacent to a large window that opened into the same room as the experimental window, and human activity inside the room may have

influenced the use of that feeder even though we kept the shade drawn during observation sessions. Conversely, position 4 was adjacent to about 3 meters of blank wall and was the farthest removed from any activity visible through the window. Welker (1984) reported that Anna's Hummingbird preferred the two end positions at a station were four feeders were arranged in a linear fashion similar to ours. In our study, male Anna's did not show any strong preference for any of the four feeder positions. It is possible that use by Allen's Hummingbirds of certain feeders may have influenced Anna's to use other, open feeders, but data on simultaneous use showed that, during the position trial, nearly 84% of 2054 visits were of single birds with a free choice of any feeder position. Thus, it seems unlikely that any detectable interspecific competitive exclusion occurred.

Our protocols called for a regular rotation of each experimental solution through all four positions in an effort to minimize any tendency to a position bias. Most trials lasted for 8 days, and each experimental solution was thus exposed to two complete rotations of the positions. Furthermore, the results of each experiment were pooled for all 8 days before analysis, thus further minimizing any position bias.

Van Riper (1958) found that Broad-tailed Hummingbirds (*Selasphorus platycercus*) in Colorado preferred sucrose over five other sweeteners, and a 50% sugar solution over weaker ones. Collias and Collias (1968) failed to get Anna's Hummingbird to use solutions with lower than 1:8 dilution ratios. In our concentration trials, both species quickly discriminated the plain-water feeder. The only visits/sips made at plain water were quick exploratory tests that, once made, did not seem to be repeated until the feeder position was changed the next day. The ability of birds to remember which of four identical feeders was unproductive and to avoid it maximizes the energetic efficiency of foraging. That the birds preferred the 50 and 66% solutions over weaker ones is clear evidence of their ability to seek rich nectar sources, with obvious survival value (Hainsworth and Wolf 1976). Even the 33% solution exceeded the apparent concentration of most natural floral nectar (Wagner 1946, Baker 1975, Stiles 1976, Hainsworth 1981, Tyrrell 1985).

The main effect of adding a perch to the feeders was to reduce the number of visits made by male Allen's and to increase the number of sips made by female Allen's and male Anna's over expected rates. Generally, the perch allowed an individual to defend a feeder more securely than when it had to hover. Thus, visits were longer, reducing the total number of visits possible at a feeder in a given time, but increasing the number of sips and the total consumption at feeders with perches. Additionally, male Allen's took 2.3 sips per visit without the perch compared to 3.7 with the perch; female Allen's took 2.5 without and 4.0 with, and male Anna's took 3.0 without and 5.7 with the perch. Though the results are mixed and not strongly conclusive statistically, the perch apparently made the feeder generally more efficient for the birds to use.

Some workers have found early morning (Stiles and Wolf 1970) or evening (DesGranges 1978) peaks in feeding rates, while others found no diurnal patterns (Wolf and Hainsworth 1977, DesGranges 1978). One might expect birds to seek reliable, known food sources actively at the

beginning of the day after a long night's fast, but neither of our species showed this pattern. The visitation rate for either species did not change from dawn until the last 1 to 2 hours before sunset, when visitation and sip rates for both species increased greatly.

The heavy use at the end of the day probably represents a need for the birds to take one last heavy energy load before the long night's inactivity. Territorial claims disintegrated during the last 90 minutes of activity and many simultaneous visits were recorded then. Also, birds often made long, 20- or 30-sip visits at that time, compared to 1- to 3-sip visits earlier in the day.

The most striking result of our studies is the clear, strong preference for the red feeder when a choice of red, blue, yellow, and green was offerred. Blue was a poor second choice, and green was by far the least preferred color of those offered. The effect was somewhat stronger for Allen's Hummingbird than for Anna's, but the results for both were highly significant. Welker (1984) worked with Anna's Hummingbirds in fall and winter in northwestern California and reported results exactly opposite to ours. She found green most and red least preferred and suggested a possible seasonal explanation for the difference. Our 1973 mid-winter results also showed a clear preference for red, but we did not offer green in that experiment. Welker's (pers. comm.) experimental apparatus and hence her results are not directly comparable to ours. She retained the plastic red sleeves supplied with the feeders as a means of hanging them. Consequently her feeders all had about one-quarter to one-third of the bottle covered with a red band that was visible to a feeding or hovering bird in spite of the fact that she placed over each feeder a hood made of construction paper of a color to match her experimental solutions. Also, she did not cover the small red corks that held the feeder stems in the bottles so that all of her feeders had red visible in two places, in addition to her colored solutions. Michael Hansen (pers. comm.) conducted a study similar to ours in the same area in a later spring and offered red, pink, white, and yellow. He found that Allen's, Rufous, and Anna's hummingbirds all preferred red over the other colors with pink a second choice and white a poor third. Pickens (1930, 1941) and Pickens and Garrison (1931) suggested that hummingbirds prefer red or violet colors, but their conclusions were not based on extensive carefully controlled experiments. Wheeler (1980) found red preferred in a well-controlled experiment, as did Collias and Collias (1968) for one female Anna's Hummingbird but not for others. Bené (1941), in a short-term, poorly controlled study, found that male Black-chinned Hummingbirds (*Archilochus alexandri*) males preferred yellow and females preferred colorless feeders. Later, Bené (1945) failed to show any clear preference for color by Black-chinned Hummingbirds. Miller and Miller (1971) also failed to show a strong preference for color in a reasonably well-controlled experiment, as did Lyerly et al. (1950).

Whether color preference is learned or innate cannot be determined from the data generated by this study, but it seems likely that hummingbirds learn to perceive color, especially red, to locate likely food sources. It is also likely that there has been a degree of coevolution between the development of red-flowered ornithophilous plants in western North America (Grant

1966) and the use of color vision by hummingbirds while foraging. Because red flowers stand out against natural green backgrounds (Grant 1966) and red is not often detected by insects, particularly bees (Raven 1972), it would be mutually advantageous for birds to develop a red color sense and for plants with bird-pollinated flowers to develop red flowers. Red would advertise nectar locations that birds learn, from an early age, to recognize as food sources (Stiles 1976). It is likely our birds already had learned to associate artificial feeders with red before these studies began. Virtually every feeder in California either uses red solution or has red-colored plastic as part of its construction. At the time of these studies, other nearby residences had operating feeders and all presented red liquid. Such preconditioning probably influenced the birds to use red when they arrived at our experimental station. Indeed, it may not be possible to find spring migrant hummingbirds in California that have not already been preconditioned to red artificial feeders!

Because high rates of use were obtained without bright colors in some of our trials, these birds obviously use other clues to find food. They undoubtedly learn where food sources are by watching other birds, and they certainly investigate any brightly colored object while foraging. We once watched a male Anna's move, in mid-winter, systematically down a line of colored Christmas lights along the eave of a house. The bird poked at each bulb regardless of color before moving to the next. The bulbs were red, blue, yellow, white, orange, and green and all were tested. During the perch trial, the red corks were left exposed and represented the only patches of bright color at the station. Apparent new arrivals invariably poked at each red cork in turn several times before learning they had to sip at the end of the feeder stem about 40 to 50 mm away. A male Calliope Hummingbird (*Stellula calliope*), a rare migrant in the area, came to the station, poked at each red cork in turn and flew off without feeding. Five minutes later he repeated the process.

Hummingbirds can use colors other than red as a "flag." Wagner (1946) found that hummingbirds in a controlled experiment took colors matching those of natural flowers most frequently visited in the same season. Stiles (1976), working with recent captives, suggested the same conclusion. Collias and Collias (1968) reported that birds tended to persist using a color once it had been identified as a food source. In carefully controlled experiments, Stiles (1976) ranked the most important factors determining use: (1) concentration of nectar, (the sweeter, the better), (2) taste (sucrose best), (3) color. He suggested that color conditioning may operate as an orientation stimulus and that red would be the best color for advertising. Woods (1927), Miller and Miller (1971), and Wheeler (1980) all concluded that location of a source, once identified as food, was more important than color in continued use of the source. It is clear that hummingbirds can remember the locations of food sources (Bene 1945, Ewald 1979) for days or even months.

We conclude that Allen's and Anna's hummingbirds make use of color vision and that discrimination of red is an important, though not indispensable, tool these birds use while foraging. Once a source is found, it is likely that other factors such as memory of location, availability of perches,

competition, quality and quantity of available nectar, etc., may be equally or more important than color in continued use of the source. The use of color in the initial location of food sources is aided by an apparent insatiable curiosity of hummingbirds to investigate all bright or unusual objects in their environment.

We are indebted to Dr. David Kitchen and Dr. Tim Manolis for critically reviewing the manuscript and making many useful suggestions for improvement.

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NOTE

FIRST MAINLAND RECORD OF THE RED-BREASTED NUTHATCH FROM BAJA CALIFORNIA, MEXICO

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On 15 September 1990 we collected a Red-breasted Nuthatch (*Sitta canadensis*) at Rancho Casa Verde, western slope of the Sierra Juárez, east of Ensenada, Baja California, México (32° 04' N, 116° 05' W; altitude 1370 m). The specimen, an adult male of 113 mm total length (Figure 1), was taken climbing in *Pinus jeffreyi*, and represents the first mainland record of this species from Baja California.

The fall of 1990 saw a large incursion of the Red-breasted Nuthatch in California, just north of the U.S.A.–Mexico international boundary (Rich Stallcup pers. comm.), and is probable that our collected bird in mainland Baja California was in transit rather than a breeder or resident.

The Red-breasted Nuthatch was known previously in northwestern Mexico only from Guadalupe Island, off the coast of Baja California (Grinnell 1928, Miller et al. 1957, Howell and Cade 1954, Jehl and Everett 1985, Wilbur 1987). In 1970 and 1971 Jehl found a small breeding population of the species in the pine woods at the

Figure 1. Adult male Red-breasted Nuthatch (*Sitta canadensis*) collected at Rancho Casa Verde, Sierra Juárez, Baja California, México, 15 September 1990.

north end of the island (Jehl and Everett 1985). However, Quintana-Barrios, during investigations of Guadalupe Island in October 1984 and 1985 and in March, August, and December 1986 did not find *Sitta canadensis* in that area.

Unitt (1984) recorded this species in San Diego County, California, U.S.A., as an uncommon and very localized resident in coniferous trees, whether planted in parks and residential areas or native in mountain woodland, but there are no Red-breasted Nuthatch records for the Baja California peninsula (Grinnell 1928, Wilbur 1987).

Given that the Red-breasted Nuthatch is a regular breeding species and irregular autumn migrant in California, sometimes in large numbers, just north of the international boundary, it is astounding that there have been no published records of this species for mainland Baja California. Once again, it is clear that ornithological investigations in the northern part of the peninsula are necessary. It is even possible that bird surveys have been so few that they have fallen between incursions of this species.

Our specimen was deposited in the Bird Collection, Laboratorio de Vertebrados, Facultad de Ciencias, Universidad Autónoma de Baja California (UABC-0297).

We thank Amadeo M. Rea and Philip Unitt (San Diego Natural History Museum) for information about Red-breasted Nuthatch records in California and Guadalupe Island, Mexico. In addition, we thank Rich Stallcup for his critical review and constructive comments to the manuscript. Philip Unitt supplied helpful editorial comments.

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